the OIL AND GAS JOURNAL

PUBLISHED WEEKLY NOVEMBER 6, 1961

NEWS

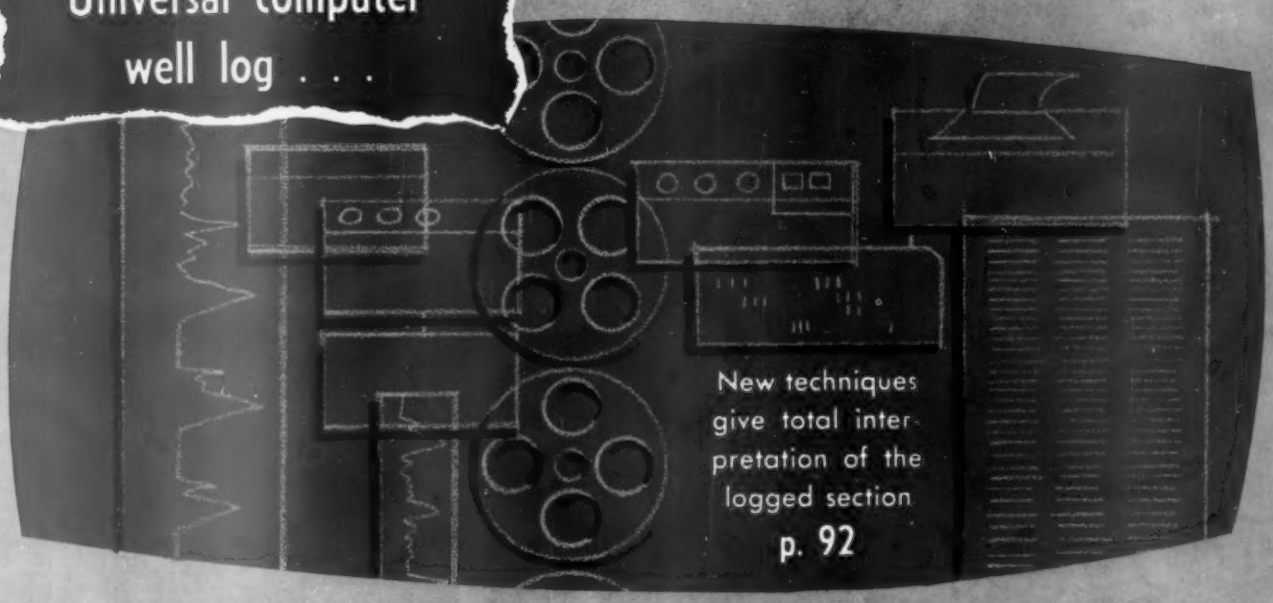
Third quarter clouds profit outlook for '61 ▸ 67

ARTICLES

Automation aids Argentine production ▸ 98

Processing construction rate rises ▸ 102

Universal computer well log . . .



New techniques give total interpretation of the logged section

p. 92

# GOLD *from the Philosopher's Stone*

In medieval times alchemists searched relentlessly for the mysterious "Philospher's Stone" to acquire its magical power to change ordinary matter into gold.

Unfortunately (or maybe not) the mystic substance was never discovered, but the concentrated search and endless experiments conducted by these secretive ancients is said to be the birthplace of modern chemistry.

Today, the constant search for new truths from new ideas is crisply referred to as "R & D." But unlike the "Philosopher's Stone," modern Research and Development in our industry has turned man's search for oil into profitable enterprises far more valuable than gold.

To be without the benefits of this "black gold" is unimaginable, and Halliburton's comprehensive R & D program is continuing to contribute to its profitable recovery.

**Halliburton** COMPANY
DUNCAN, OKLAHOMA

OIL AND GAS JOURNAL
Vol. 59, No. 45

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# Technology

## Exploration


New universal computer well log ..... 92

*By S. B. Ballen and R. A. Broding*

New techniques in digitizing and computer analysis now provide a log which gives total interpretation of the entire logged section. Tedious, detailed calculations can be made quickly, and calculated data permit the analyst to instantly pinpoint zones giving evidence of hydrocarbons.


## Refining-Processing


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Construction report shows 80 refining, gas-processing projects ..... 107

*By Robert B. Bizal*

A rash of gas-processing construction in Canada, new helium plants in the U. S. Southwest, and a proposed refinery for the Gulf Coast highlight current construction activity.

Progress report on the Lomax process ..... 117

*By James G. Eckhouse*

New commercial and pilot-plant data show the results of upgrading diesel oil, No. 2 fuel oil, and condensate to gasoline, and upgrading vacuum-gas oil to diesel oil and gasoline.


## Pipelining


Heed warnings and forestall shutdowns ..... 104

*By Paul Fink*

Almost all equipment failures give ample advance warning. Consolidated Natural Gas has found that paying heed to such warnings with a properly staffed and equipped unit will repay its cost many times.

Casing splitter eases crossing jobs ..... 128

Method has proved successful for Texas Eastern Transmission because it usually costs less than relocating the line, and it does not require cutting down throughput while the work is going on.


## Production


Automation licks Argentine production problem ..... 98

*By Ed McGhee*

New ultramodern oil-production system in Argentina's gigantic Comodoro Rivadavia field is making oil handling more efficient and less expensive by minimizing three perplexing problems: (1) remote location, (2) weather extremes, and (3) high-viscosity crude.


## Drilling


Bit records show drilling progress ..... 120

*By L. L. Payne, H. B. Woods, and R. S. Grant*

Hughes Tool Co. has accumulated on accounting machines all the current records of its bits run in the field. Great masses of bit records can be analyzed quickly on the machines. The analysis reveals clearly where we've been and where we're going in rotary drilling.

THE OIL AND GAS JOURNAL **Newsletter**

November 6, 1961

## Significant this week

Figures on third-quarter earnings are in, and they're disappointing.

Poor showing was only to be expected, when you consider developments of the 3 months: skidding gasoline prices, excessive refinery runs, crude-oil price whittling.

There were a handful of exceptions to the sad-earnings rule. Texaco, Socony Mobil, and Union Oil of California reported increases.

Even with decline, 9-month earnings are running ahead of same period in 1960. But unless conditions get better, the 1961 profits performance is likely to be spoiled (p. 67).

Suppliers and equipment manufacturers have been forced to adjust to tough conditions in the past few years.

They've done it in much the same way as the operating segment of the industry—through diversification, expansions abroad, reduced payrolls. Plenty of problems still exist, but suppliers should now be in sounder business condition (p. 74).

Gas producers believe field price of gas is too low, and that the law requires it must be raised.

These points are part of the presentation made by producers at recent Permian-basin hearing in Washington. Validity of their argument depends on whether FPC accepts their interpretation of the law and the regulatory theory used in building their case.

Henry D. Ralph, Journal's chief editorial writer, examines these angles in the second of a series of articles on the Permian presentation (p. 78).

Meanwhile, California producers are getting a break on the wellhead price of gas in the southern part of the state.

Price will rise 5.47 cents per thousand cubic feet at start of year. That will push price to just below the price commanded by out-of-state gas at the state border (p. 72).

With 80 gas-processing and refining projects in the works, industry construction has a healthy look.

Gas-processing plants have the edge in the Journal's latest construction summary: More than 40 such plants are on the drawing boards or have been started. Fourteen of these are in Canada, most of them with large capacity (p. 107).

IPAA expects U. S. oil demand to pass 10-million-barrel-

daily mark next year for the first time, a 2.8% gain over 1961.

But association's supply-demand committee says increase won't help crude producers unless imports are cut, or unless stocks of crude and products are reduced from current high levels (p. 70).

In other action at Houston meeting last week, IPAA:

—Voted to oppose any federal legislation that would permit competitive bidding on wildcat federal lands (p. 70).

—Offered to help Interior Department make constructive study of present Mineral Leasing Act (p. 70).

—Heard a report from its cost-study committee to the effect that well-drilling costs are still rising, though less rapidly than in the past (p. 69).

Texas Railroad Commission has set a special allowable of 238,000 cu. ft. daily for that disputed Bright & Schiff well in Normanna field, and signs indicate that field's major operators won't fight this action (p. 68).

Highlights in news from abroad:

Decision's imminent on big-scale importing of liquefied natural gas from Sahara into Great Britain.

British Government is expected to okay the project—long opposed by coal industry—without waiting for study on plants that make town gas from coal by Lurgi method.

Approval would mean $30-million investment (p. 87).

Iraq's absence from Tehran conference of Organizations of Petroleum Exporting Countries underscores lack of unity among members.

OPEC's latest conference is third full-size affair. But the group is still in organizational throes and some essential studies being prepared by various committees have not yet been completed (p. 90).

## News in the making

Steed subcommittee on oil imports will bear down on two points in hearings that open in Washington November 20.

First point: economic health of U. S. producers and refiners, including changes in number of jobs and number of producers and refiners—with reasons for changes.

Second point: ability of oil to step up output to meet demands of war or peace, and time needed to reach top output.

Some 50 witnesses are being lined up, starting with Interior Secretary Stewart L. Udall or Assistant Secretary John M. Kelly. Subcommittee's chairman is Oklahoma Rep. Tom Steed.

Current opinion of fuel-cell researchers: Primary hope for low-cost power lies in high-temperature cells.

These would be fueled by liquid hydrocarbons, natural

gas, or coal. Pressing need's for simple, adequate, fuel-conversion equipment.

Work on high-temperature cell has been lagging, but the pace is being quickened.

Companies taking part in proposed Suwanee products line from Houston area to Atlantic seaboard disagree on capacity.

That's one of the stumbling blocks at present. Some are wary of overcapacity, while others want ample provision for expected future needs.

Despite disagreement, preliminary steps have been taken toward acquisition of right-of-way.

Faster, easier, and more accurate ways of measuring gas are being investigated by one of the major gas companies.

Its test station is looking into the mass meter, an orifice meter with computer, turbine meter, a vortex velocity meter, and a rotary positive-displacement meter which handles previously unequaled volumes and pressures.

Breakthrough in catalytic-cracking operations may be just ahead.

Regenerator temperatures are creeping up, with consequent rapid catalyst aging and deterioration.

Higher regenerator temperatures mean different materials for vessel walls. Stainless-steel cyclones are being placed in some units for better heat resistance.

Prediction: catalysts may be tailored to needs of individual cracking units.

Nearly every Mid-Continent refiner either has made cost studies on various hydrocracking processes, or is making them.

Consensus seems to be that there's a reasonably good pay-out if price differential between No. 2 fuel oil and regular gasoline is 3½ to 4 cents per gallon.

Steel companies are still expected to knock out that 4% discount on oil-country tubular goods.

Talk of price reinstatement cropped up when contract pay raise for steelworkers took effect last month. Nothing has happened since them, but knowledgeable source says "there's every chance the discount will eventually be dropped."

Another wildcat play is shaping up in Alaska.

Site: 500,000 acres on Alaska Peninsula. Operator will be a "major company" now dealing with group of independents who own leases.

Mobil Oil spent more than $4 million on two dry holes on peninsula in 1950-60, but more drilling is in prospect.

Great Basins Petroleum, one of leaseholders, says details of an agreement are being completed.

# Market memo

Nov. 6, 1961

**Gasoline prices** are moving up in the Mid-Continent.

Now all marketers need to be happy—if that's possible—is some sustained cold weather to kick off fuel-oil sales.

Suppliers generally last week marked up the wholesale price on gasoline one-half cent to 10 cents a gallon for regular.

**Another half-cent increase** to 10.50 cents is expected this week.

This isn't surprising in view of market support from inter-refinery buying and the latest cut in refinery runs.

**Crude runs** are down 219,000 bbl. daily for the latest week to 8,146,000 bbl. daily. They are still too high but at least moving in the right direction.

More significant is the **2,127,000-bbl. drop in gasoline stocks** to a total of 183,178,000 bbl. This drop comes at a time when gasoline stocks normally are rising and adds strength to the market.

**Gasoline** on the Gulf Coast is in a steady position for the moment. Same is true for river markets.

Discounts of one-fourth to three-eighths cent off the 11-cent posting for 92-octane are reported possible on the coast.

River prices likely are one-half to three-fourths cent off the Gulf Coast low.

**Distillate stocks** are up 4,134,000 bbl., which just reminds us it's now November and fuel-oil movements are still too modest.

Some marketers fear a balmy November will drown us in heating oils.

Prices of distillates remain firm in nearly all major supply centers. Upward price movements in the Midwest still need better demand to become real.

Marketing notes:

Oil companies still **lack effective training** programs for their own salesmen and dealers. Survey in Tulsa shows company salesmen still too often are inexperienced, dealers lack knowledge of the business, and both are unhappy with each other (p. 76).

Preliminary analysis of **API's advertising campaign** promoting travel this summer indicates that motorists can be motivated to drive more for pleasure—and use more gasoline. Results are in the hands of market research committee which will analyze them further and recommend whether the industry should mount a major campaign next year.

**American Oil** has won Utah court fight to use its company name and trademark Amoco in Cache County, Utah. Right had been challenged by Logan, Utah, jobber who contended he had registered his business under that name in 1955.

Ten major oil companies have placed initial orders for aluminum foil cans to package motor oil. Layers of laminated aluminum foil and fiber replace metal in the can body. The attraction: Lower cost, lighter weight, and high-speed production.

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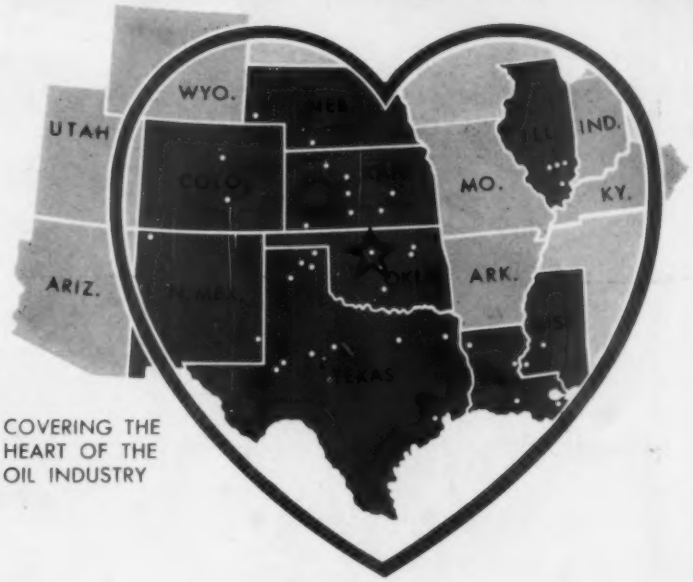


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Reed Cobra bits are just one example of the outstanding economies made possible by Reed's continuing program of research and development. These bits are setting phenomenal records all over the oil country in both mud and air drilling. For example—

On a West Texas well, drilling with mud below 12,000 feet, four Reed Cobra bits drilled 2,289 feet in 404½ hours. On an offset well it took 37 tooth bits to drill 2,172 feet in 558 hours. On another West Texas well a Cobra bit set an air drilling record of 3,644 feet in 103 hours.

In Pennsylvania, drilling with air, it is routine for one Reed Cobra bit to complete the hole from surface casing to TD. In this area total footage per Cobra bit regularly exceeds 7,000 feet.

Drilling with mud in East Texas in the tough Travis Peak formation Cobra bits consistently get runs up to 250 feet. Drilling with gas in Mississippi 10 Cobra bits drilled 6,850 feet in 358½ hours. In the same vicinity more than 10 times this number of tooth bits were required to drill the same footage with mud.

There is a Reed man near you. Let him give you the full story on Reed Cobra bits and the Reed Quality Line—tool joints, drill dollars and rock bits.

# PIONEERS IN EFFICIENT DESIGN

# REED COBRA BITS

## IN MUD OR AIR

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In cementing – fracturing – acidizing . . . regardless of the service your well needs, when you're ready to do the job that requires running a packer, you're *glad* you called Halliburton. Halliburton always gives top priority to the design, development and manufacture of its service tools and equipment.

This *built-in quality* is additional reason for the confident feeling you have when the Halliburton crew drives up to your lease. They bring experience of over *three million* service jobs with them.

Men, materials, experience . . . all working together make you glad you called HALLIBURTON.

### RTTS PACKER...

Halliburton's Retrievable Test-Treat-Squeeze Packer is a good example of built-in quality. Since this multi-purpose tool is retrievable, valuable rig time can be saved with its use because *several* zones may be treated during one trip into the hole. Full opening design of the RTTS permits passage of perforating and other small tools. For added safety, the RTTS contains a built-in safety joint.

### DM/DC SQUEEZE PACKER...

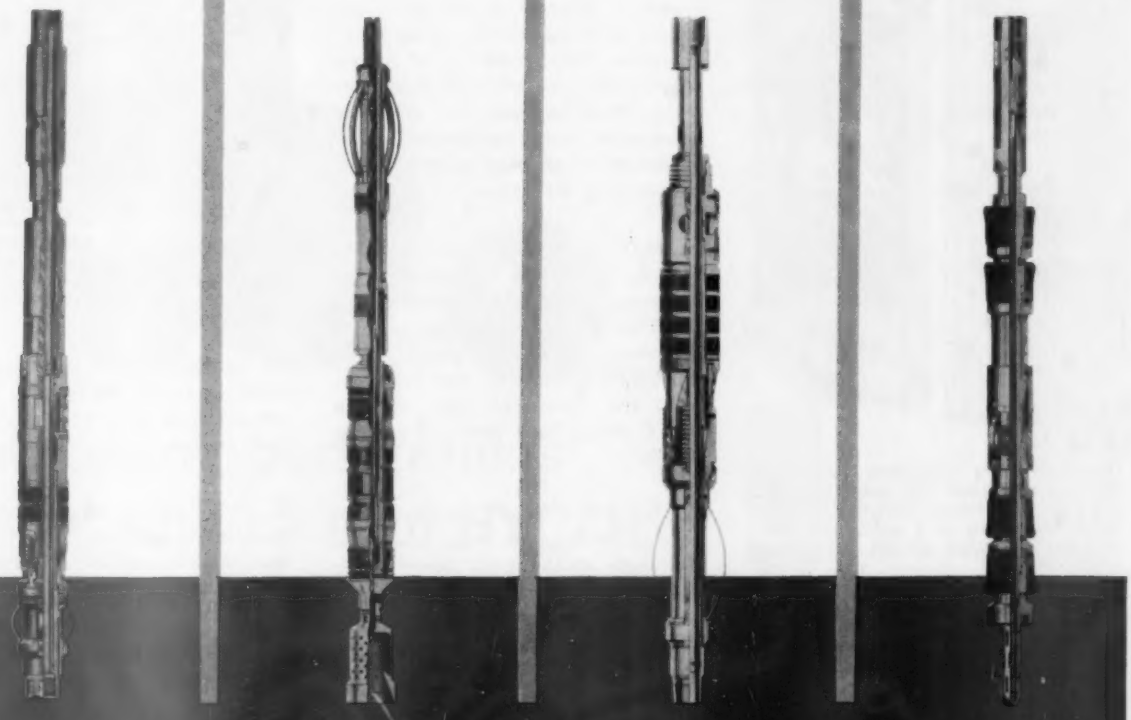
incorporates a built-in back pressure valve to help retain built-up pressures following a squeeze job. Safety in operation is another important feature since the tubing and circulating valve are completely freed from DM/DC packer prior to mixing cement or beginning other treating operations.

### HM PACKER...

a full-opening hydraulic mechanical packer equipped with a built-in circulating valve. The HM Packer features simplicity of operation ... tool is set by merely turning tubing to the right and slacking off weight. Following the job, picking up on tubing will release the packer for removal or re-setting.

### CUP TYPE RETRIEVABLE BRIDGE PLUG...

the versatile Halliburton tool designed to hold pressure from either direction. Used separately or in conjunction with the RTTS or other Halliburton Packers, the combination arrangement becomes a straddle packer with unrestricted spacing. Also, since the tool is retrievable, it may be moved with the packer to straddle and treat several zones without round-tripping the tubing.



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## SPECIAL TOOL SERVICES

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# SIX REASONS WHY O·C·T CASING HANGERS OUTPERFORM OTHERS

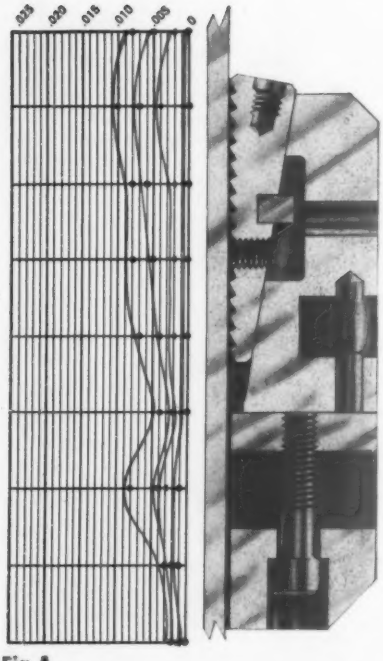


**Fig. A.**

**The curves above show inward diametrical deflection of 5½-inch J-55 casing suspended in a C-22 casing hanger. Deflection is plotted in 0.001-inch units at 9 points. Test loads were 60,000, 120,000, 180,000, and 230,000 pounds.**

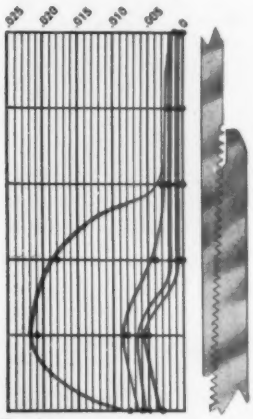


**Fig. B.**

**These curves show inward diametrical deflection of a standard API coupling at various points. During the pull tests, this coupling was placed below the C-22 casing head for which deflections are shown in Fig. A. Deflections plotted in Fig. B were observed at the same time and at the same loads as those in Fig. A.**

**1.** Slips in O-C-T casing hangers cause only minimum casing deformation. For example, a typical O-C-T hanger, the C-22, actually **causes less deformation than a standard API coupling!** Results of pull tests at casing loads up to 230,000 pounds appear in Figures A and B. These results mean that O-C-T casing hangers cause little reduction of casing I.D., giving you full-bore access for tools. These hangers also give you dependable casing suspension, with no danger of slipping caused by excessive pipe deflection.

**2.** O-C-T's slip-bowl design (See Fig. A) gives you automatic shock-absorbing action that protects casing heads by converting a large part of any sudden load shock into a downward force component. This helps explain the remarkable fact that **no O-C-T casing head has ever split in service!**

**3.** O-C-T's slip-bowl hanger design does not allow seat wear to change the angle of the slips. Many other hangers with slips that engage the casing head directly no longer remain at the proper angle as seat wear occurs.

**4.** The 45° angle of O-C-T casing head seats gives superior load-bearing qualities and reduces compression forces on casing. Many other hangers are designed with 7-10° seat angles that produce excessive compression.

**This test equipment was used to obtain deflection data presented in Figures A and B. The hydraulically operated device at left can test tubing and casing hangers at loads as large as 1,000,000 pounds.**

**5.** O-C-T casing hangers are always designed to provide all the practical load capacity needed in properly designed casing strings.

**6.** Weight is evenly distributed on packing in O-C-T hangers automatically. Many other hangers require manually setting screws to distribute weight properly.

**For more information on the design advantages you get from O-C-T casing hangers, see your O-C-T representative. His know-how and experience are at your disposal from the time you start planning your completion until your O-C-T wellhead is set in place.**

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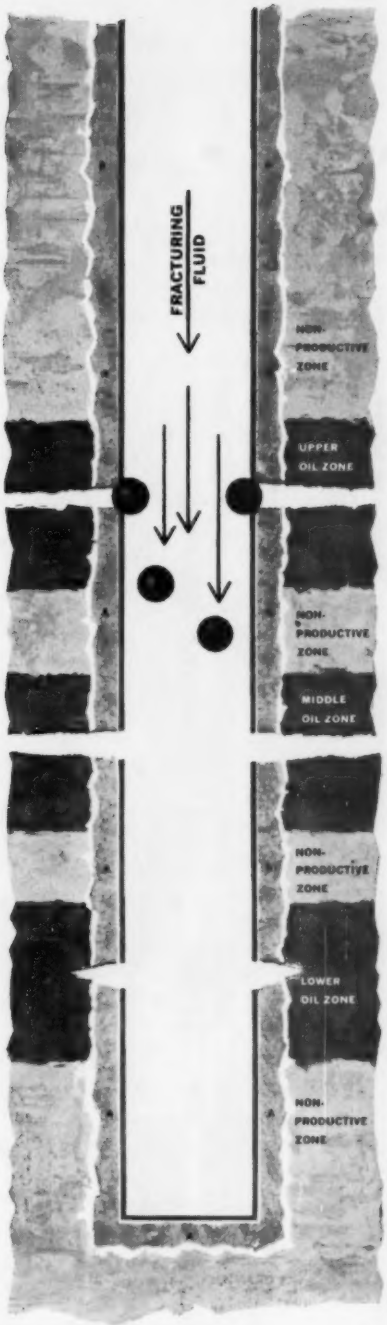
# Well casing perforations sealed with balls of HYCAR

Each of these balls—nylon, covered with Hycar nitrile rubber—will form a seal within a well casing, closing off perforations that are taking fracturing fluid. The balls are injected into the fluid stream, finding their own places as pressure forces them onto holes in the casing. When pressure is relieved, balls fall to the well bottom or may be recovered by mechanical means.

The balls have a solid nylon center to keep them from extruding or squeezing through the slightly smaller holes under high pressure. Their Hycar cover gives them the necessary resilience under pressure and variable temperatures for a seal. Hycar also provides unusual resistance to attack by acidizing or fracturing solutions, as well as excellent extra abrasion resistance.

Here's another sample of the way Hycar provides resilience under the toughest oil-field conditions—of heat, pressure and corrosive influences. It will pay you to get more information about Hycar. Write Department MF-9, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.




Ⓐ Sheath of set cement between pipe and wall of hole.

Halliburton Company, Duncan, Oklahoma, uses these balls for its fracturing operations. Balls are covered with Hycar by Oil States Rubber Company, Arlington, Texas. B.F.Goodrich Chemical Company supplies the Hycar rubber.

**B.F.Goodrich Chemical**

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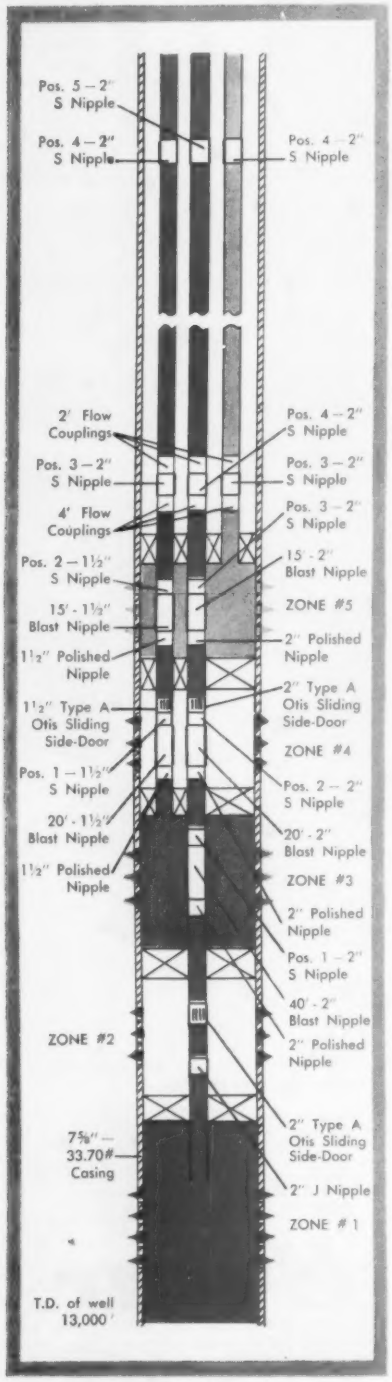
**Hycar**

Rubber and Latex

OTIS PRODUCTION NEWS

*Volume II, Number 1* **Otis Engineering Corporation • Dallas** *Production Equipment and Services*


Pos. 5 – 2" S Nipple
Pos. 4 – 2" S Nipple
Pos. 4 – 2" S Nipple
2' Flow Couplings
Pos. 4 – 2" S Nipple
Pos. 3 – 2" S Nipple
Pos. 3 – 2" S Nipple
4' Flow Couplings
Pos. 3 – 2" S Nipple
Pos. 2 – 1½" S Nipple
15' - 2" Blast Nipple
ZONE #5
15' - 1½" Blast Nipple
2" Polished Nipple
1½" Polished Nipple
2" Type A Otis Sliding Side-Door
1½" Type A Otis Sliding Side-Door
ZONE #4
Pos. 1 – 1½" S Nipple
Pos. 2 – 2" S Nipple
20' - 1½" Blast Nipple
20' - 2" Blast Nipple
1½" Polished Nipple
ZONE #3
2" Polished Nipple
Pos. 1 – 2" S Nipple
40' - 2" Blast Nipple
ZONE #2
2" Polished Nipple
2" Type A Otis Sliding Side-Door
7⅝" – 33.70# Casing
2" J Nipple
ZONE # 1
T.D. of well 13,000'

*Copyright 1960 Otis Engineering Corporation*

# Alternate Zone Triple Completion Shows Economic Advantages of Using Otis Equipment and Wire Line Services

LAFAYETTE — This offshore, multiple-zone gas well, located off the coast of Southern Louisiana, illustrates the economic advantages of using Otis sub-surface flow control equipment and wire line services.

The cost of the installation, including the tubing safety valves, sleeves, nipples, and other Otis sub-surface equipment as shown in the accompanying diagram, totaled slightly under $12,000 — or about $65,000 less than what it would cost to move a workover rig onto the well to deepen it and recomplete the lower zones, had the well been drilled and completed differently. As equipped, this well can be produced until all five zones have been depleted, with only occasional wire line service to permit production from each of the different zones.

T.D. of the well was approximately 13,000 feet with five different zones of potential production below 12,600 feet. When called to engineer the completion, Otis specialists were asked to design an installation that would permit alternate production of three of the zones through the long string and one through each of the other strings, or two zones through the long string and two through the intermediate string, with the top zone to be produced through the short string.

Two single packers were used to isolate zones 1 and 2 and a Type A Otis Sliding Side-Door and Type J Otis Landing Nipple were made up in the tubing between the two packers. This arrangement will permit the bottom zone to be produced first through the long string, and then zone 2 by setting a Type PJ Otis Plug Choke in the landing nipple and shifting the sleeve in the Sliding Side-Door®. The Type PJ choke is designed to hold pressure from either direction.

A blast nipple with a Position 1 Type S Otis Landing Nipple above and a polished nipple below was designed into the long string opposite zone 3. This is the zone to be produced through the intermediate string. In the event flow from zone 3 should cut through the blast nipple, the landing nipple and polished nipple will be used to pack off the hole and permit continued production of either of the lower zones through the long string. The landing nipple above the blast nipple may also be used to land a plug choke in the event both lower zones deplete sooner than anticipated and the operator decides to produce zone 4 through the long string.

Otis sliding side-doors were designed into both the intermediate string and the long string between the packers isolating zone 4. This will permit selective production of that zone through either string of tubing. S nipples, blast nipples, and polished nipples were also made up on both the intermediate and long strings opposite zone 4 to provide the tubing with the same protection as described for zone 3.

In that this was a gas well, S nipples with flow couplings above and below were made up in all three strings of tubing, immediately above the top packer, to accommodate Type FS Otis Tubing Safety Valves. This provided Storm Choke® protection for each string. By locating the safety valves just above the top packer, the operator will be able to carry on a corrosion inhibitor program without pulling the safety valves. S nipples were also located in each string approximately 1,500 feet from the surface for plugging purposes until gathering lines could be laid.

This Otis-engineered completion was designed to provide the ultimate in economical, versatile, and efficient alternate-zone production. For more information on alternate-zone, multiple completions or for help with any other specific completion problem, call the Otis office nearest you or write Otis, Dept. 1-W, Box 35206, Dallas 35, Tex. Experienced Otis specialists are ready and anxious to provide you with a "packaged" well completion service.

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Engineering Corporation

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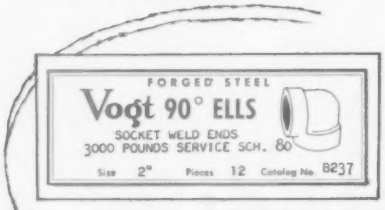


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Vogt modular designed cartons give added handling and storage space economies. All dimensions are in multiples of 3 inches.

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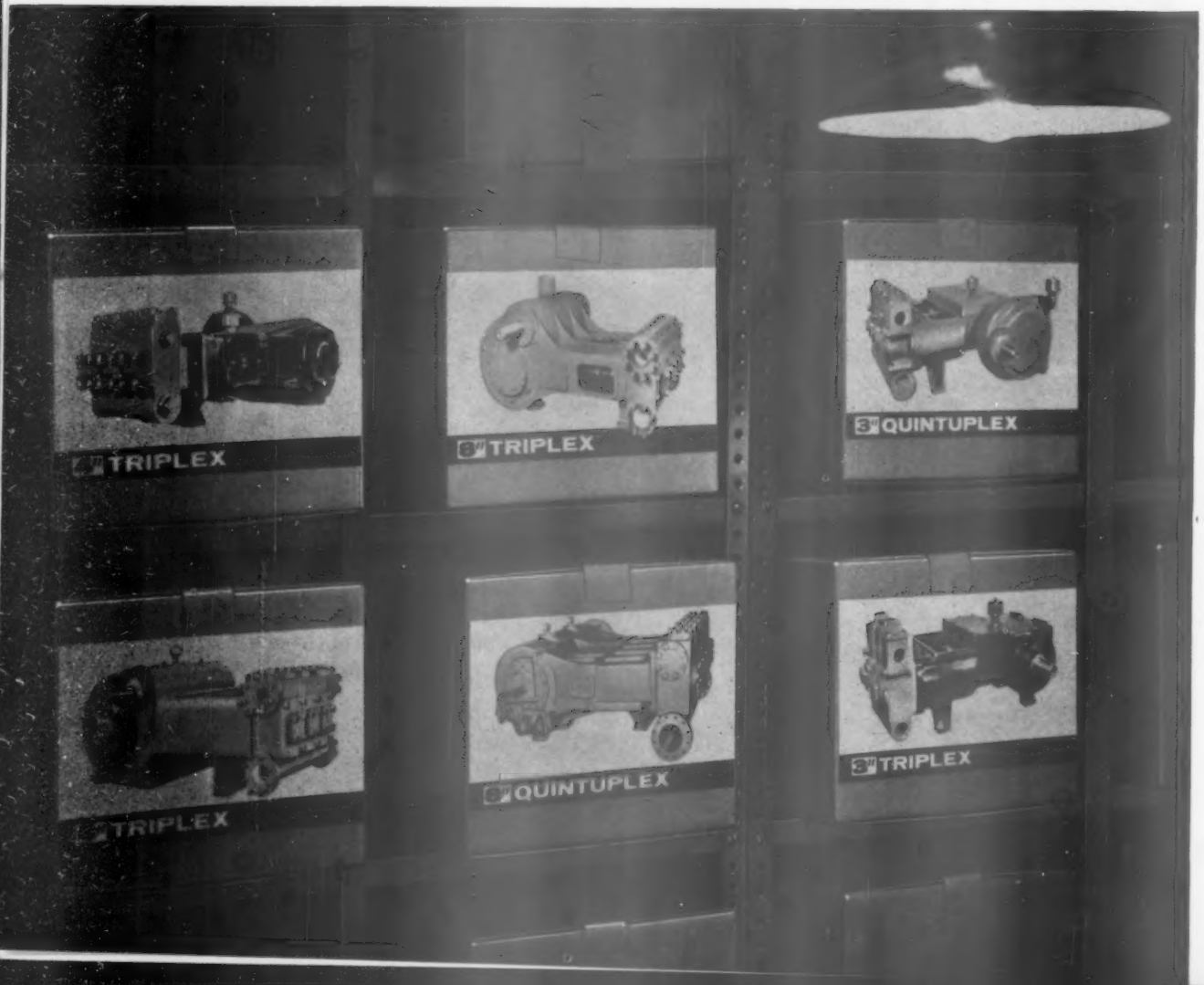
PRODUCTS
SERVICES
STORES

## "Variety store"... a pump for every waterflood

We say "variety" because of "Oilwell's" ability to supply a plunger pump for *any* service ... formation fracturing, acidizing and cementing, hydraulic subsurface operation, waterflood, LPG flood, pressure maintenance and salt water disposal.

The picture illustrates our 3", 4", 6" and 8" Triplex and 3" and 8" Quintuplex Pumps. All feature horizontal construction, a design that can't be equaled for efficiency, ease of maintenance and low operating costs. One immediate advantage of horizontal design is the lowness of suction and discharge lines which results in maximum utilization of suction head and simplifies piping layout.

For your best guide to sizing the best plunger pump for your fluid-injection problems, write for a free copy of "Oilwell's" new "Plunger Pump Selection Manual." It includes volume-pressure curves that take the guesswork out of sizing, and it gives you complete performance data for plunger sizes available with each pump, plus a wealth of other information about how to apply the pumps and how to size and arrange suction and discharge piping. Write on your company letterhead for our Manual M29-1060.



# We never shelve service problems

You'll never find an "Oilwell" Pump Specialist on the shelf, because his business is *field service*. You will find him hard at work all over the oil country. His assignment is to help you plan for proper conditions to assure best pump operation. He knows his way around all the subtleties of liquid characteristics; elevation; intake piping size and arrangement; and intake pressure-speed relationships. Considering the cost of a mistake in horsepower, capacity, pressure requirements or a handful of other intricacies, it's worth your while to take advantage of your "Oilwell" Pump Specialist's services. He's there to de-bug your operation, and one of our ways of making sure that when you buy "Oilwell" equipment, you get a lot more than our product.

# How to get fluid end part replacements fast

"Oilwell" stores stock a complete range of fluid end replacement parts including Co-Hard plungers, valves and seats, stuffing box packing and parts. Replacement is no further away from you than your nearest "Oilwell" store because we make sure we'll have what you need on our shelves *when* you need it. Our store managers are there to help with pumping problems, too, and you'll find their long experience to be valuable in practically any producing problem.

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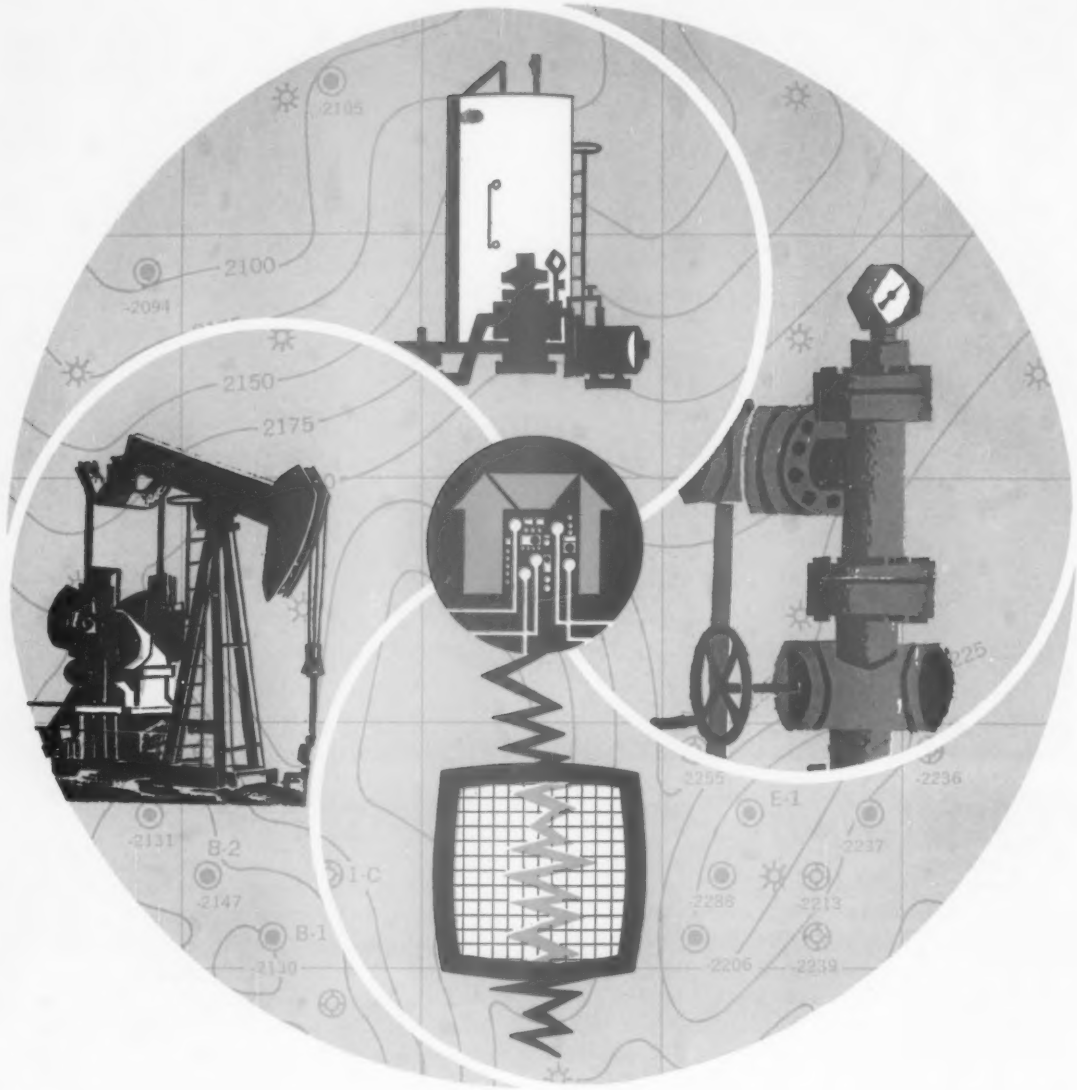

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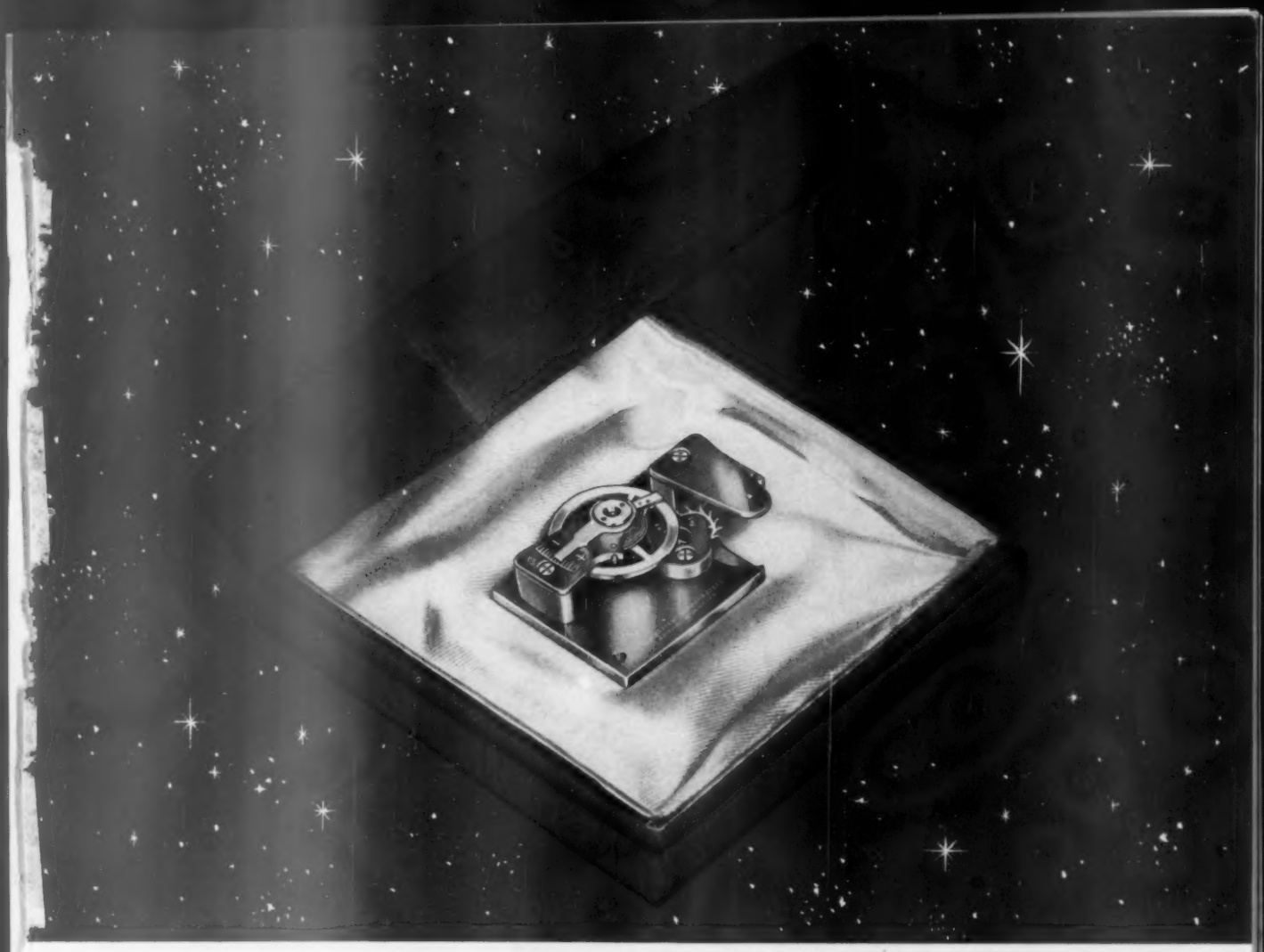

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Now, for the first time you get the extra value of a jeweled movement. This superior construction makes Rockwell chart drives more accurate and sensitive than ordinary chart drives. It requires less power to drive and is extremely durable since there are seven hard jeweled surfaces to overcome friction and wear.

You can use these jeweled movement chart drives *with profit* to power all your recording instruments. They will adapt into practically any instrument case. Speed changing turrets (see left) permit varying rotation rates at will. Write for bulletin. Rockwell Manufacturing Company, Dept. 59L, Pittsburgh 8, Pa. In Canada, Rockwell Manufacturing Company of Canada, Ltd., P.O. Box 420, Guelph, Ontario.

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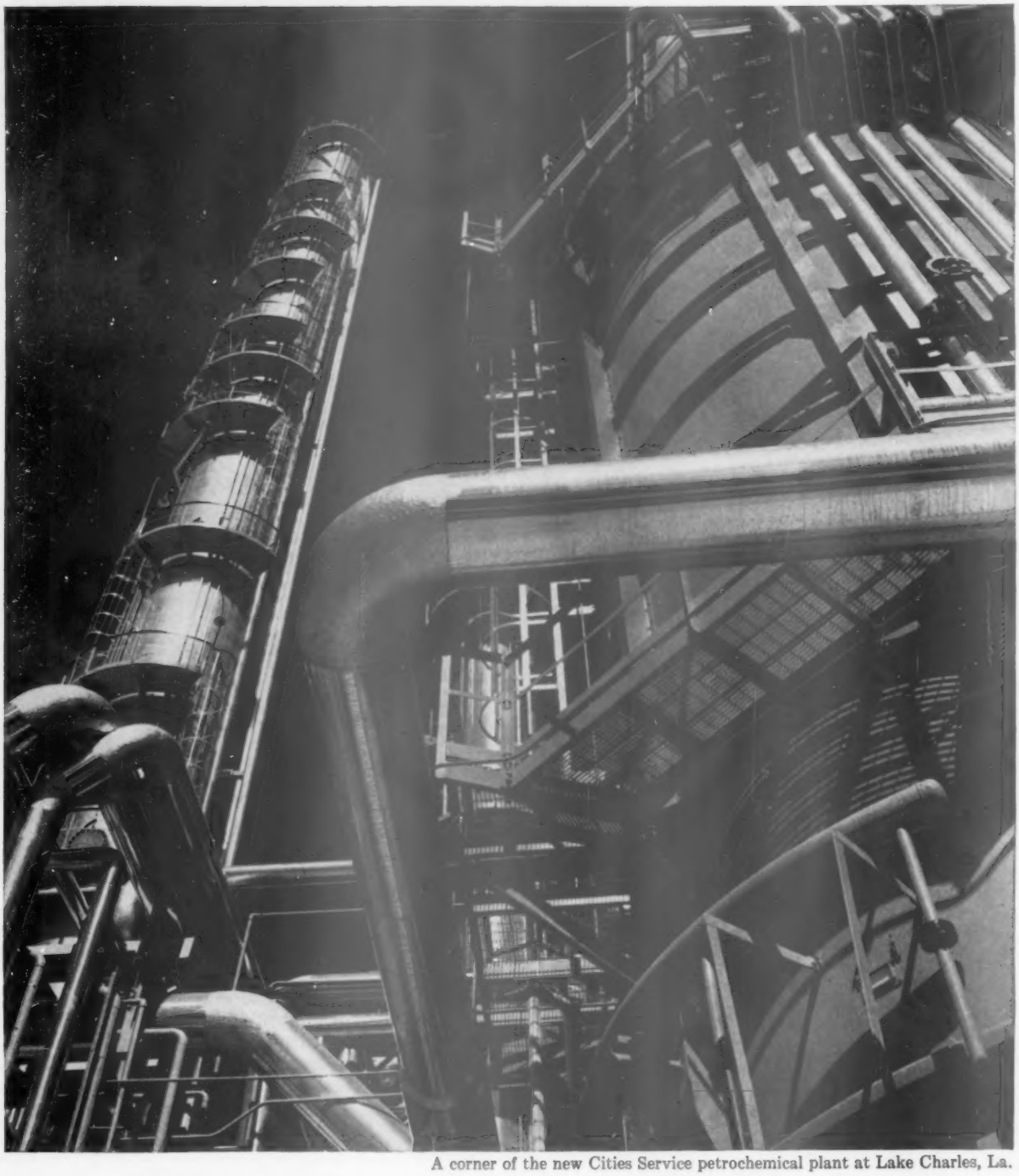


A corner of the new Cities Service petrochemical plant at Lake Charles, La.

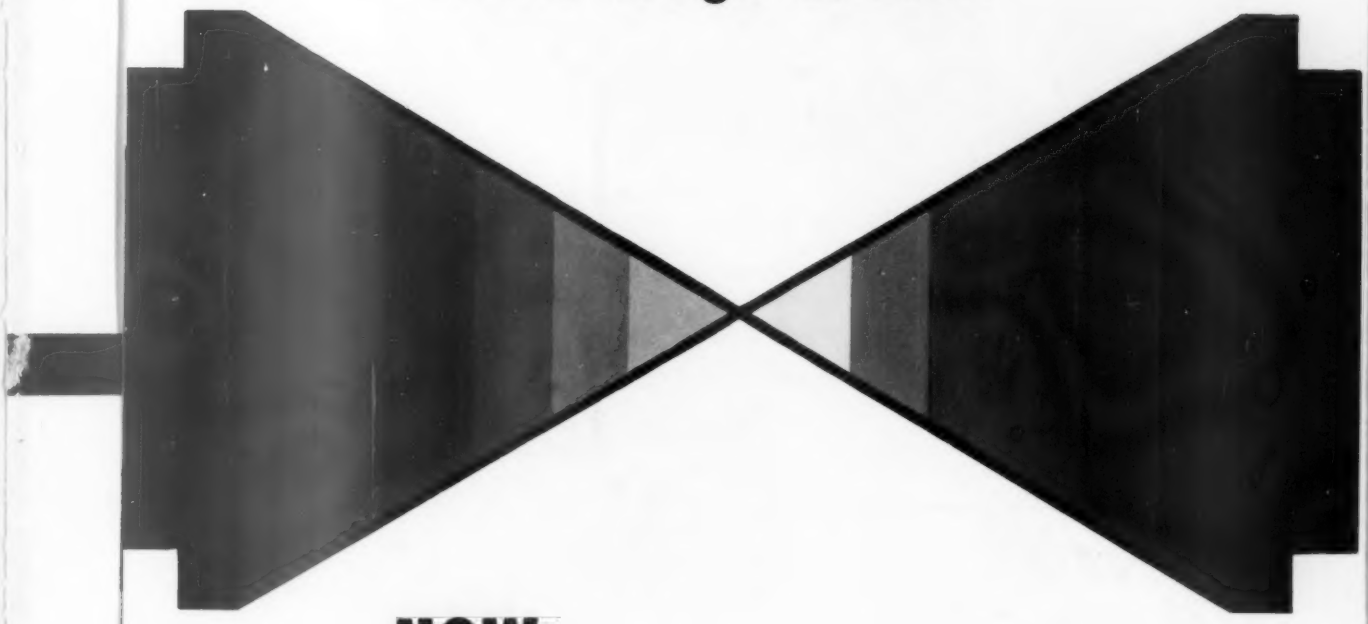
# Cities Service on the move

Even without visible motion—action! The shining towers and conduits of this new orthoxylene plant symbolize Cities Service progress in the expanding field of petrochemicals.

Chemists know that petroleum is a great storehouse, laden with materials vital to today's industry—resins, plastics, dyes, pharmaceuticals—only the imagination can complete the list. To make the best possible use of this abundance through an ever-increasing flow of new and better petrochemical products—*Cities Service is on the move!*

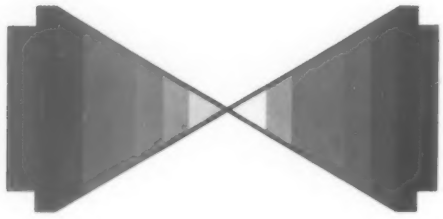
CITIES SERVICE

Some valves are designed
for the easy services...
the others,
for the tough ones...

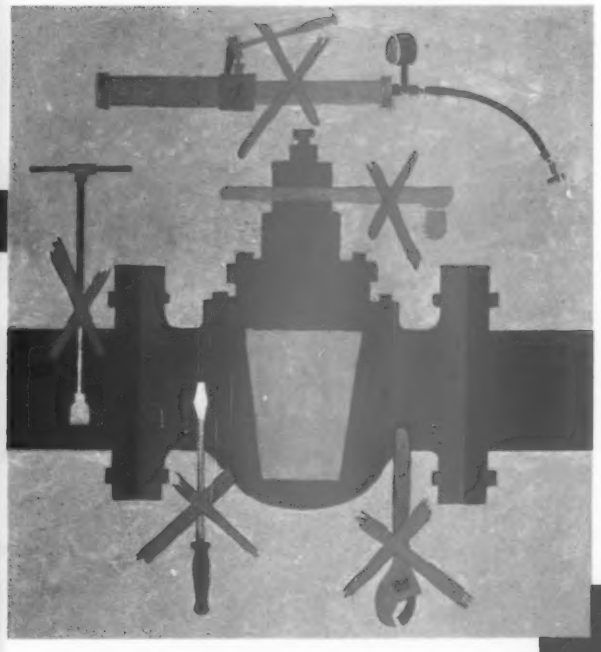


**NOW,**
**ROCKWELL HAS DEVELOPED**
**AN EXCITING, NEW**
**CONCEPT THAT**
**SPANS THE SPECTRUM**
**OF VALVE SERVICES**

# THE NEW ROCKWELL PE



## Now, in one
## for versatile



### Attention-Free Performance

Some valve users put a premium on a valve that can be installed and forgotten —that needs no attention. For many non-critical services, this kind of valve is adequate: the new Rockwell PERMATURN valves can be used in such services with no attention—and with excellent results.

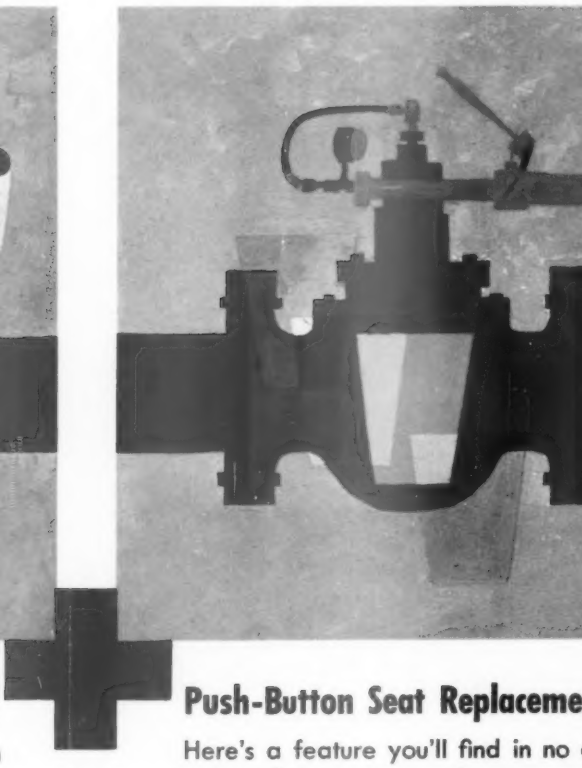
### Easy 90°-Turn Operation

Fast opening and closing are easier with the new Rockwell PERMATURN than with any other valve ever developed. Just a quick, smooth quarter-turn from full-open to shut-off, and this unique valve design assures low-torque operation always—that's where the name PERMATURN comes from!

**LIFT THESE PAGES for more information on this exciting new valve**

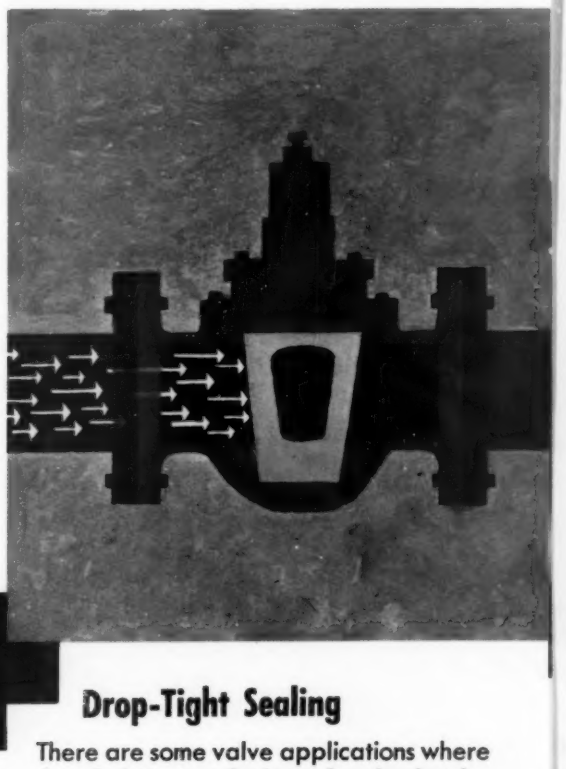
# PERMATURN® VALVE DESIGN!

## ne valve, you get all the features needed
## le application to any fluid control service



### Push-Button Seat Replacement

Here's a feature you'll find in no other type valve: you can put a new seating surface in the new PERMATURN valve in seconds, *without loosening a single bolt.* You can replace valve seats as often as you like—no more putting up with leaky valves. You add years of life—and save money—with this performance-extending feature of PERMATURN valves.



### Drop-Tight Sealing

There are some valve applications where there's just no substitute for the bottle-tight, wear-defying characteristics of the new Rockwell PERMATURN valve used with a *regular program of sealant replacement.* And in these critical services, the PERMATURN valve has dramatically reduced operating torque requirements.

**alve line!**

# THE NEW ROCKWEL

# available in all siz

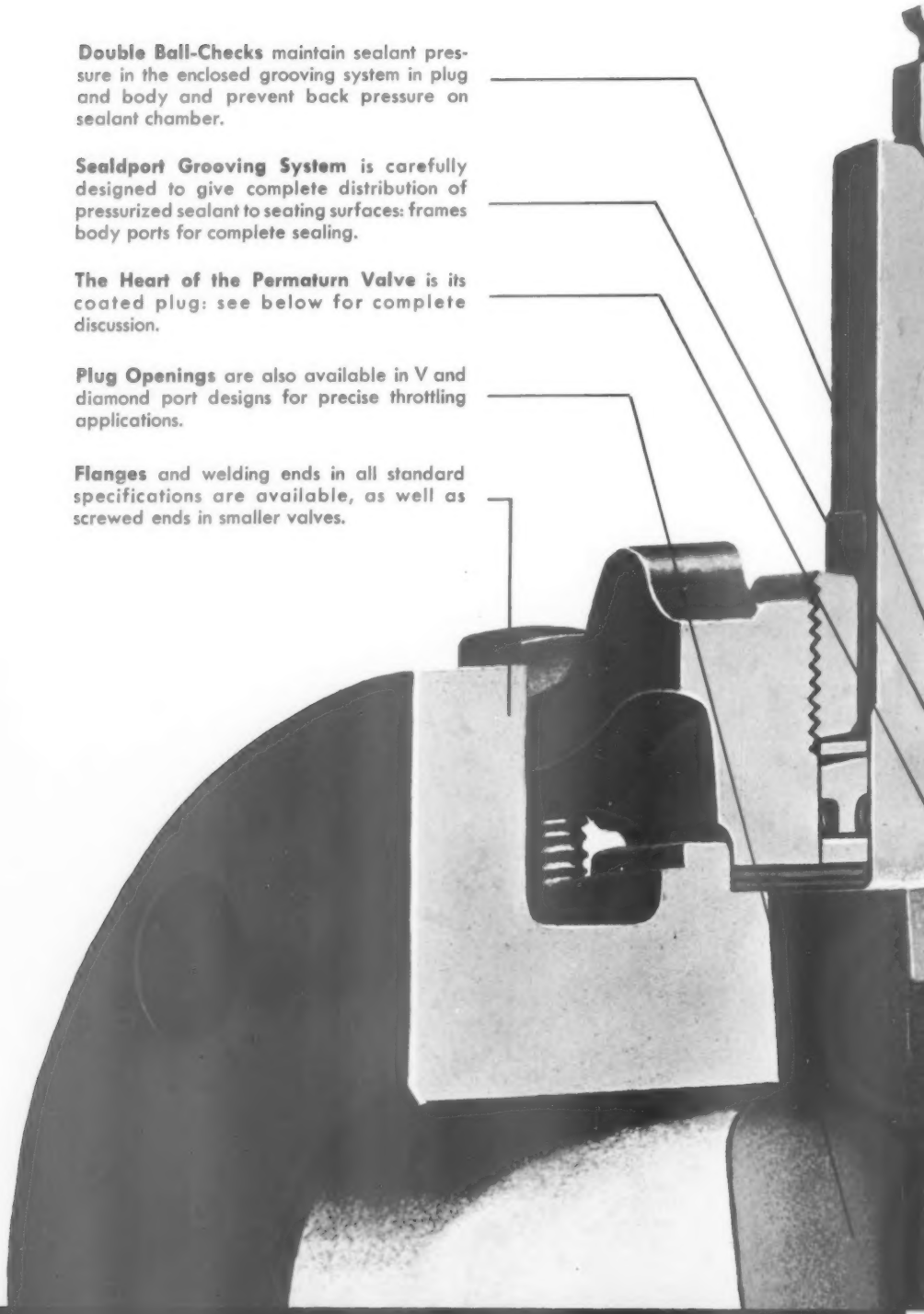
**Double Ball-Checks** maintain sealant pressure in the enclosed grooving system in plug and body and prevent back pressure on sealant chamber.

**Sealdport Grooving System** is carefully designed to give complete distribution of pressurized sealant to seating surfaces: frames body ports for complete sealing.

**The Heart of the Permaturn Valve** is its coated plug: see below for complete discussion.

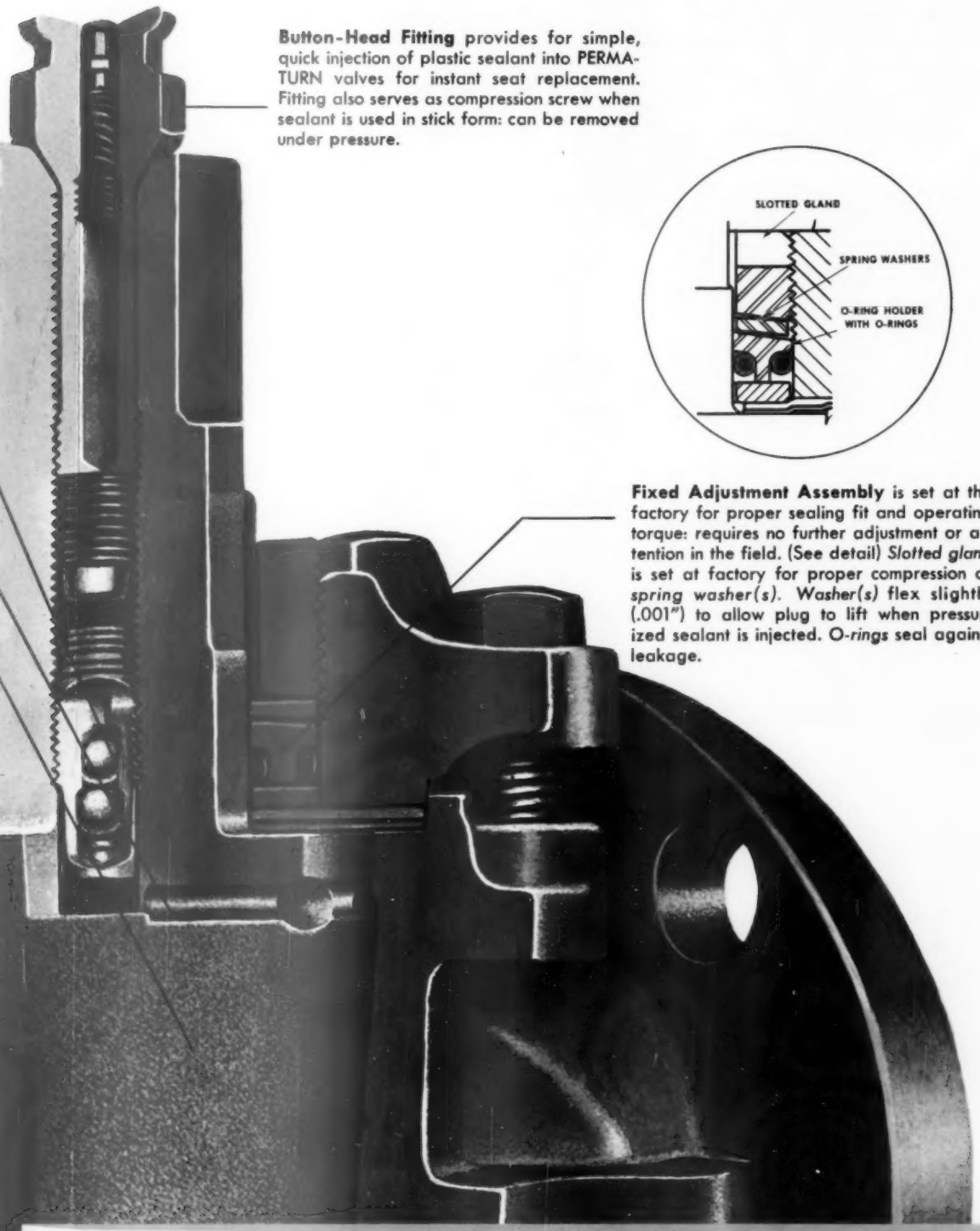
**Plug Openings** are also available in V and diamond port designs for precise throttling applications.

**Flanges** and welding ends in all standard specifications are available, as well as screwed ends in smaller valves.



# LL PERMATURN® VALVES

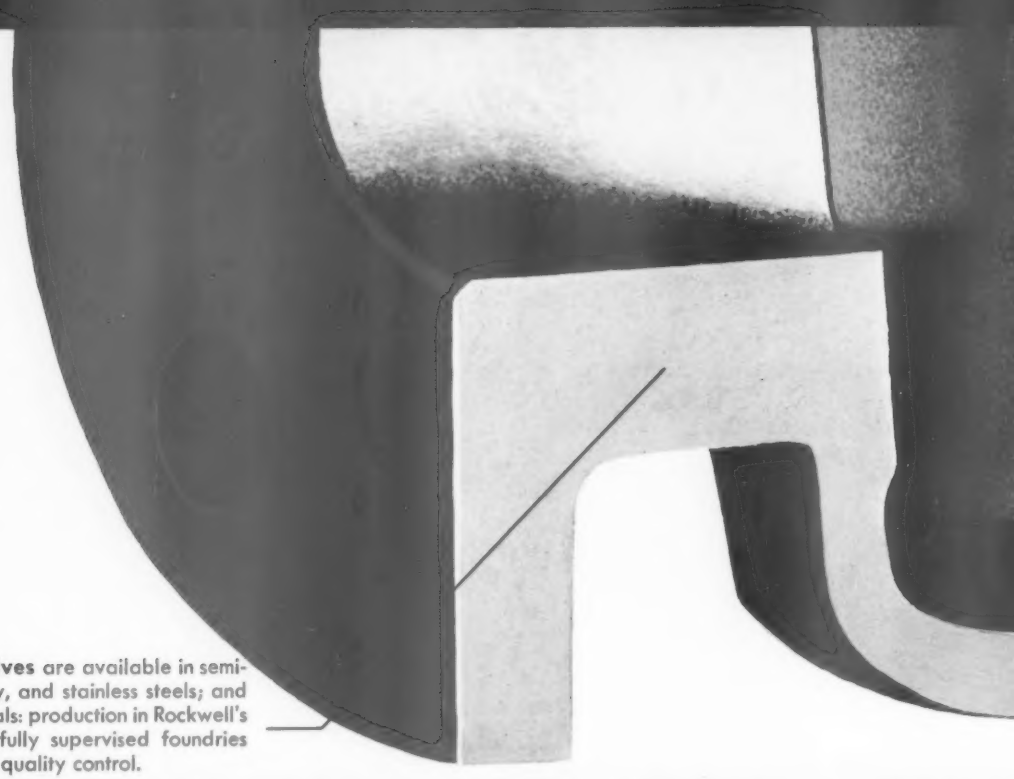
# izes for all pressures



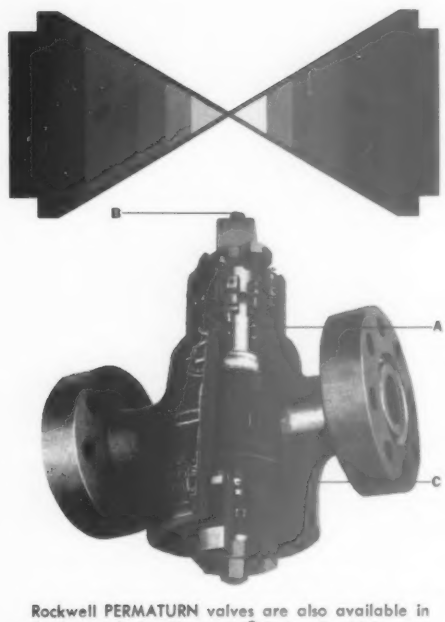
**Button-Head Fitting** provides for simple, quick injection of plastic sealant into PERMA-TURN valves for instant seat replacement. Fitting also serves as compression screw when sealant is used in stick form: can be removed under pressure.




**Fixed Adjustment Assembly** is set at the factory for proper sealing fit and operating torque: requires no further adjustment or attention in the field. (See detail) *Slotted gland* is set at factory for proper compression of *spring washer(s)*. *Washer(s)* flex slightly (.001") to allow plug to lift when pressurized sealant is injected. O-*rings* seal against leakage.



**PERMATURN Valves** are available in semi-steel; carbon, alloy, and stainless steels; and non-ferrous materials: production in Rockwell's own modern, carefully supervised foundries provides excellent quality control.




Rockwell PERMATURN valves are also available in the inverted plug Hypreseal® design for high pressures. Low torque operation is assured by plug coating of high lubricity and bearing-guided stem. Other features are plastic stem sealing (A), fitting for "push-button" seat replacement (B), and thrust assembly (C) for controlled plug adjustment.

# The secret of the PERMATURN® valve'

The unique design feature that makes the Rockwell PERMATURN valve line applicable to all valve services is its coated plug.

Developed after five years of extensive testing, the coating has an extremely low coefficient of friction and is applied in such a way that it is *permanently bonded to the metal surface of the plug.* This tenacious lubricating film gives *permanent separation of metal surfaces* of plug and body: the valves literally cannot stick or freeze.

The inert nature of the plug coating assures permanent lubricity for easy, sure operation of the PERMATURN valve at all times. Combined with the many other new design features described above,

the p
valv

**Atte**
fluid

**Easy**
even
tion

**"Pus**
usefu

**Drop**
this

**Structural Design** of the PERMATURN valve is the strongest of any valve available today: body ribbing gives complete freedom from distortion at rated pressures and temperatures.

# ne Rockwell e's versatility...

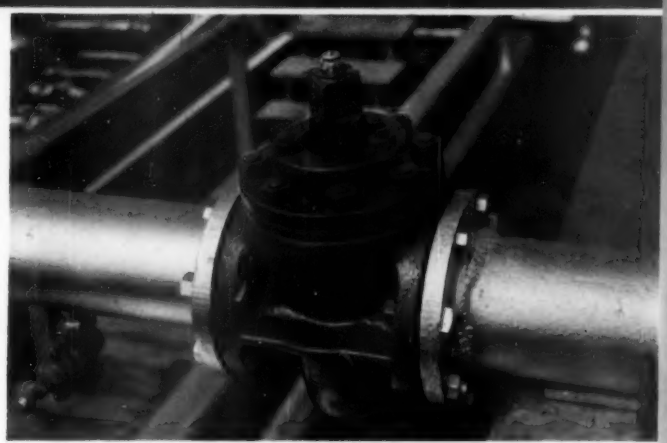
he plug coatings give the Rockwell PERMATURN valve these versatile application benefits:

**Attention-Free Performance** in services where luids handled do not require a special valve.

**Easy, 90°-Turn Operation** in all valve services, ven where remote operation or infrequent atten- ion are involved.

**"Push-Button" Seat Replacement** extending valve sefulness without costly downtime and maintenance.

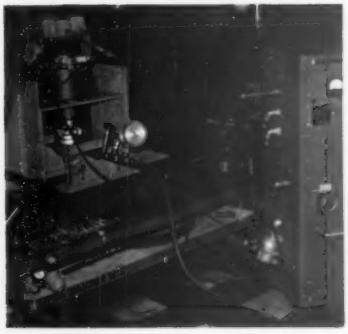
**Drop-Tight Sealing** for critical applications where his feature is all-important.



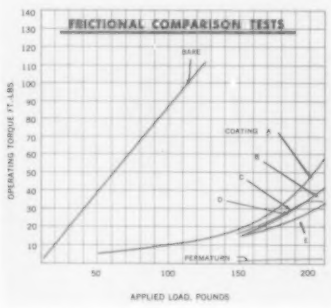
Rockwell semi-steel PERMATURN valves are shipped with a distinctive red primer paint that has wide compatibility.

Steel PERMATURN valves are given a gray prime coat: both colors give good corrosion-protection in storage and in service.

# Only Rockwell, world leader in valve research, could have developed the PERMATURN® valve



For more than forty years, Rockwell has pioneered in valve research. This background of experience, which made the Rockwell-Nordstrom lubricated plug valve the world's standard of quality, led to the five year development program on the PERMATURN valve, a new concept in versatile, all-purpose valve design.




Part of this study concerned the various characteristics of many compounds considered for the plug coating medium. Exhaustive mechanical and chemical resistance tests, and carefully measured frictional comparisons, led to the selection of a material which has proved its ability to stand up under tough service for years of normal valve operation.

Complete production facilities for the new PERMATURN valve have been installed at Rockwell's nationwide valve manufacturing plants. The equipment shown above was specially developed to coat the plugs of Rockwell PERMATURN valves on a production line basis and is typical of installations at other Rockwell plants.

## Rockwell PERMATURN® valves have been customer-proved before introduction

**NO ATTENTION** has been given these Rockwell PERMATURN valves on hydrocarbon service in the year and a half since their installation. Operation is positive and easy—and shut-off is still as bottle-tight as the day the valves were installed.

**JET FUEL** is handled by these Rockwell PERMATURN valves, in service since 1960. Operators have found the plug coating of PERMATURN valves gives smooth, easy operation—and has reduced sealant injection needs from once-a-week to once every three months.

**SURE OPERATION** on tough services has been proved by pilot installations of PERMATURN valves across the country. The coated plug supplements a regular program of sealant replacement, needed in these services for long valve life, to assure low-torque operation at all times.

---

**Rockwell Manufacturing Company**
Pittsburgh 8, Pennsylvania

I'd like to have your "Pocket Valve Guide" with brief specs and coverage charts on Rockwell PERMATURN valves.

Name_____ Title_____

Firm_____

Address_____

City_____ Zone_____ State_____

ROCKWELL PERMATURN VALVES
another fine product by
ROCKWELL

*For continuous full-load pumping*

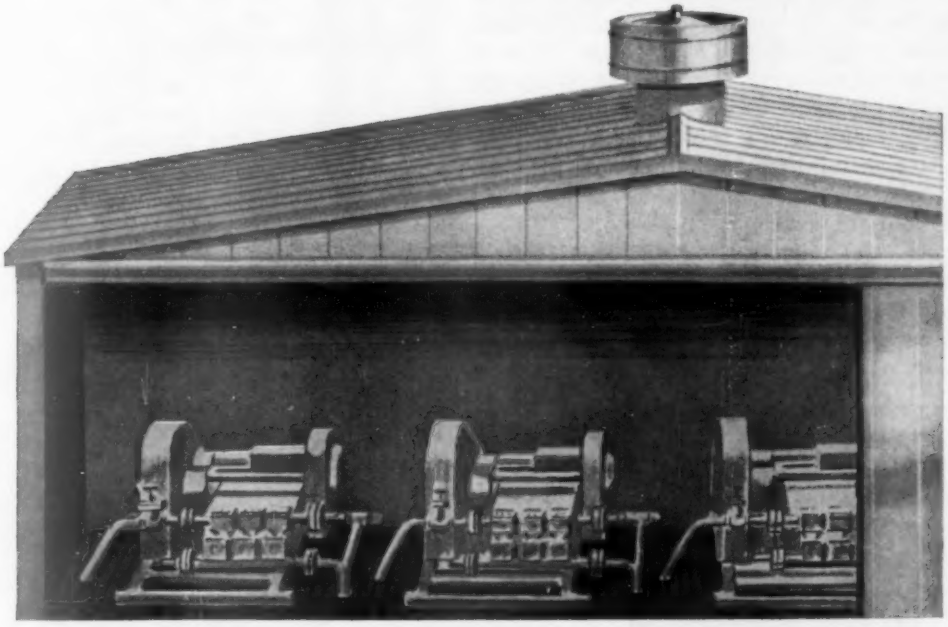
*on waterflood projects*

## . . . the rugged Bethlehem Tp

The hardest workers in waterflooding are the injection pumps. Bethlehem's sturdy high-pressure Triplex Plunger pumps will stand up under full-load operation week after week and not miss a stroke. Wherever the pumping is tough—in waterflood systems, pipelines, refineries, salt-water disposal work—you'll find lots of Bethlehem TP's going strong.

Simple construction with controlled flood lubrication makes Bethlehem TP's easy to maintain. And they're readily adaptable to the specific job—plungers and fluid ends are available in a choice of materials. Speed reducers are optional.

Check with the Bethlehem store in your area. If you'd like more information about our rugged TP's first, write for our Booklet 1644, *Bethlehem Power Pumps.*



**A SIZE FOR EVERY NEED**

Choose between the TP-3, TP-4, and TP-6
Capacities: 100 to 9,565 BPD
Plunger Loads: 3,580 to 10,000 lb
Pressures: 438 to 3,180 psi

For more capacity, investigate Bethlehem's Duplex series, the U-33, UA-46, and U-510
Capacities: 155 to 13,500 BPD
Piston-Rod Loads: 2,400 to 12,000 lb
Pressures: 340 to 1,698 psi

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BETHLEHEM STEEL

**BETHLEHEM STEEL** SUPPLY DIVISION

Improve your Engineering I.Q.*

* INCOME QUOTIENT

## *Engineering-Management Status: Dream or Mirage?*
## *Technology an asset, but other training required*

The complexity of modern industry has created a great demand for management personnel with engineering training. Surprisingly, there is a very short supply of such men, i.e., engineers with enough potential to be groomed for executive functions.

Historically, as big industry moved out of restricted, private ownership into broader public ownership, two things happened, both of which added to the demand for "management men." First, public ownership made possible more diversified management, as opposed to the centralized control characteristic of family ownership. Second, the complications and diversification of modern industry have sharply increased the ratio of executives to employees. Where the ratio was formerly approximately one executive to 100 employees, it is now more like one to 35.

Recognizing that employment has increased by about one-third during the same period, the need for management personnel becomes clearer. Not only do few engineers graduate from school ready to be managers, few of us study courses as undergraduates which would prepare us for executive leadership later in our careers. Finally, as a prerequisite for managing the affairs of others, there is no substitute for experience.

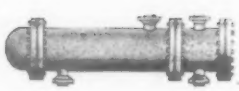
WHAT DO YOU REALLY WANT?

If you are facing this important decision in your present status, get your future into focus before taking the step. Decide what you really want from your personal and business careers. It is sometimes too easily assumed that all men want to move on to higher, executive positions. With few exceptions, all men pay lip service to "wanting to get ahead," but too many of us hoodwink ourselves into believing this means management responsibilities, without fully recognizing the significance of such a step.

As a matter of fact, all men *don't* want to advance into management. Some, however, find this out too late, for unless they are psychologically and emotionally suited for the rigors of management, the driving ambition to assume more leadership, responsibility and authority may not in itself be a worthwhile goal. If a man is doing well where he is, it may be a mistake for him to try to move into the management orbit, for the move to management is not the only door to advancement.

WRITE FOR YOUR COPY TODAY

. . . the growth of an engineer, either into greater achievement in technology or into executive responsibility, is a matter of gratification and importance to Western. In our own organization, as well as in our customers' firms, we have seen "fledglings" make lasting contributions to the science of processing and the business of management. Recognizing the importance of an early and correct choice of each man's road to success, we have devoted one of Western's "professional development" booklets to this important subject, and there is a copy waiting for you, without obligation . . . Also without obligation, we offer our assistance in the solving of your next heat transfer problem.



WESTERN
HEAT EXCHANGERS
WESTERN SUPPLY COMPANY
P.O. Box 1888 – Tulsa, Oklahoma

# PARKERSBURG MAKES A SUCKER OUT OF ROD LIFTING 22,000 LB. LOAD

When they switched to Timken® tapered roller bearings on the wrist pins and pitmans in this pumping unit, Parkersburg Rig and Reel Company announced another first—a seal guaranteed for 200,000 hours operating service. Now the sucker rods can lift oil from the earth while the new seals keep oil in the bearings for the equivalent of over 20 years operation!

Timken bearings provide uniformly accurate bearing clearance settings to hold the shaft exactly on center with the seal. Dirt stays out, lubricant stays in. And with Timken bearings, Parkersburg could get tight fits on both cups and cones without complicating the assembly. Stress concentration is minimized because Timken bearings permit ample radius on the shaft. And the effective spread of Timken bearings gives maximum internal stability. If you buy or build oil field equipment, our experienced engineers will be glad to show you how Timken bearings can help you get maximum performance with minimum attention. The Timken Roller Bearing Company, Canton 6, Ohio. Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits. Canadian Division: Canadian Timken, St. Thomas, Ont.

Industry rolls on

**TIMKEN®**

tapered roller bearings

# Drilling contractors . . . . . .

J.L SUPPLY

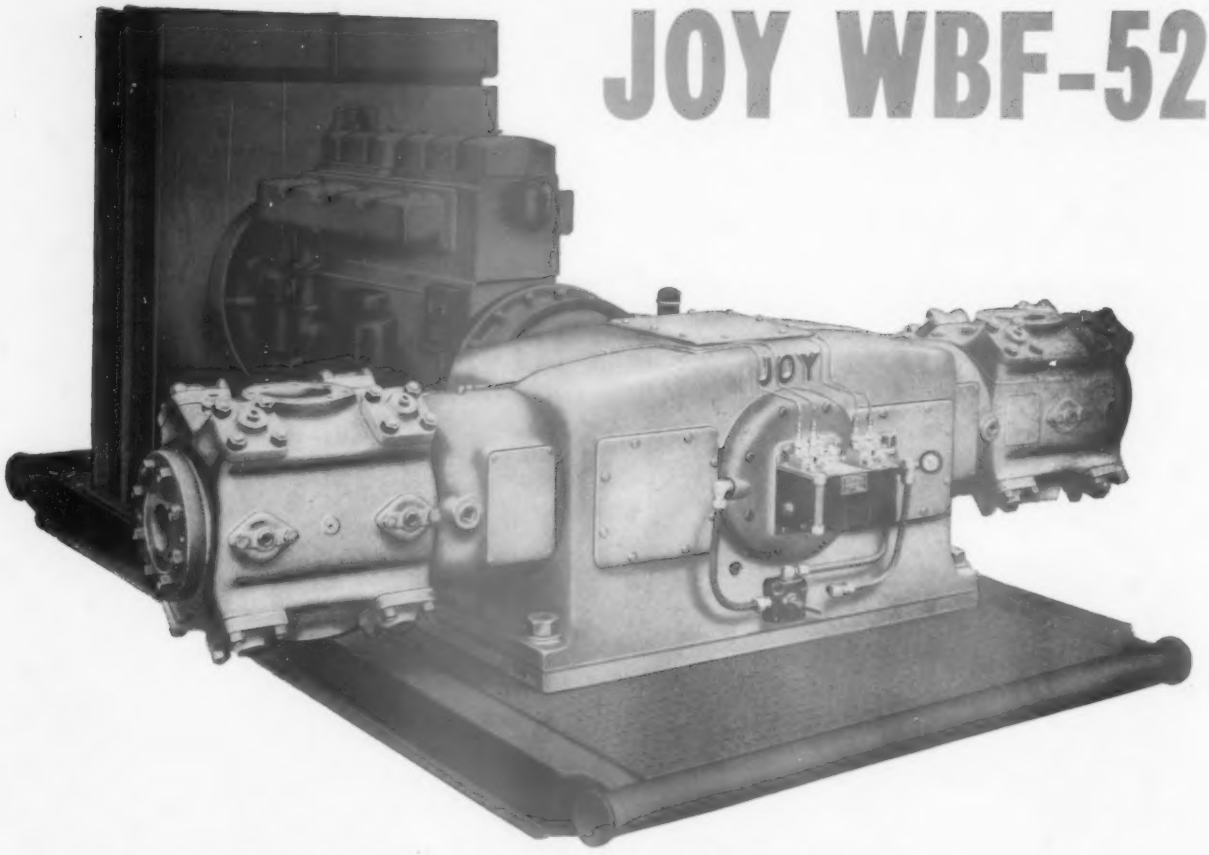
# . . . here's J&L teamwork!

Expert teamwork goes with J&L drilling equipment. Parts and service are made readily available, and J&L men take an active interest whenever and wherever the rig moves in.

Your files should include the latest general information and engineering data on Gardner-Denver mud pumps and parts, J&L drill pipe, rotaries, drawworks, blocks, compounds, masts ...even expendable items such as J&L wire rope. Call your local J&L Supply man now, or write us at Tulsa, 1435 South Sheridan Road.

**Jones & Laughlin Supply Division « Tulsa**

# JOY WBF-52

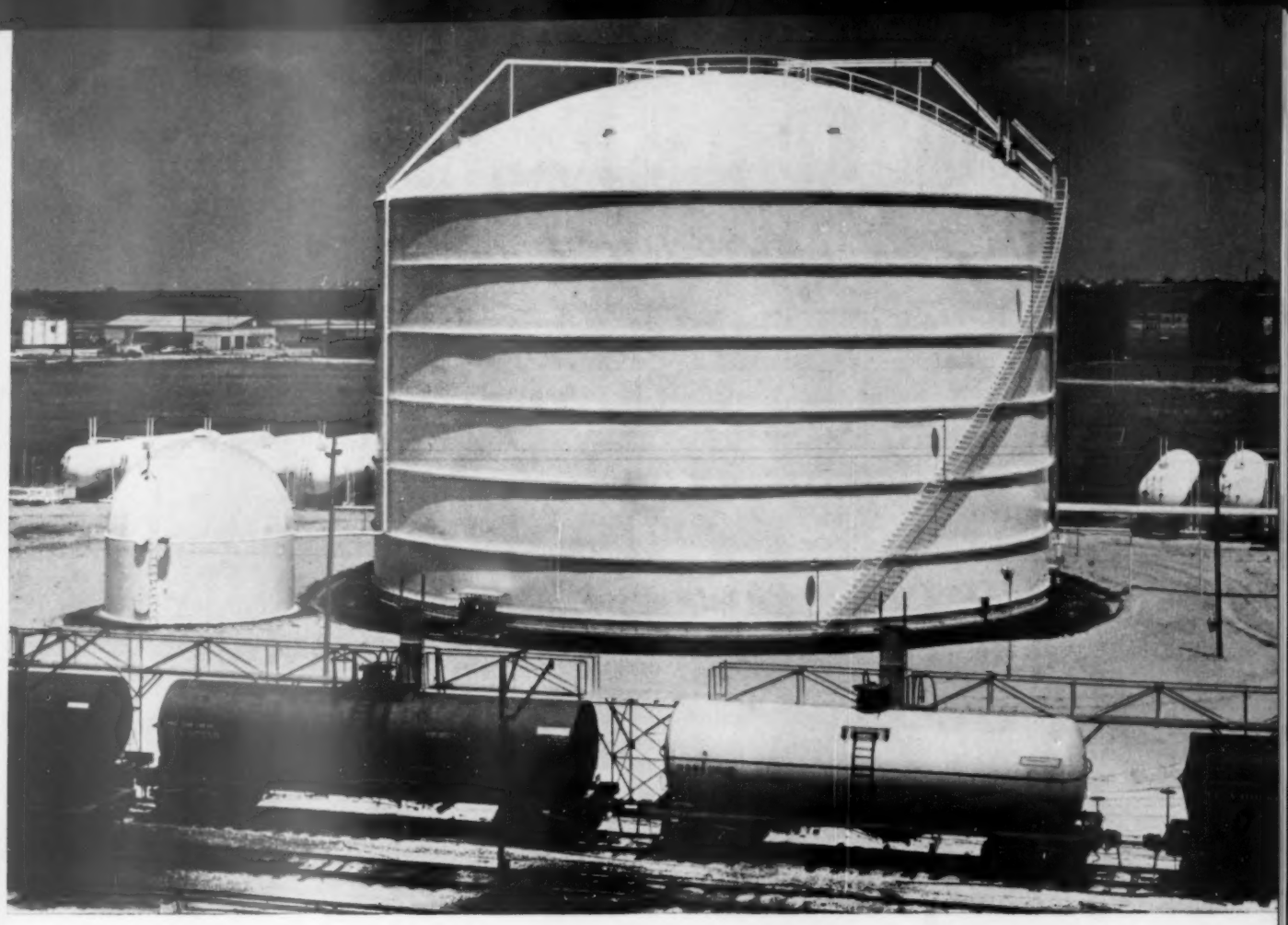



## A NEW HORIZONTAL OPPOSED COMPRESSOR BUILT ESPECIALLY FOR GAS GATHERING

The Joy WBF-52 is a heavy duty, two cylinder horizontal opposed packaged gas compressor. Based on Joy's many years of experience in the oil and gas fields, the WBF has all the features demanded by the economics of the gas handling business. The compressor, direct connected to a 1000 rpm natural gas engine, is complete with scrubbers, coolers and controls, all mounted on a sturdy oil field-type skid. The unit is completely portable and may be installed on barges, trailers, slabs or piling because of its inherently smooth running characteristics.

If you encounter changing field conditions of capacity or pressure, simple changes of clearance plugs or cylinders can be made. Many different cylinders may be mounted on the same basic frame with complete interchangeability. These features, plus simple conservative design mean long service under the most rugged field conditions. Consult your nearest Joy fabricator for complete information on the new WBF-52 compressor package.

**Denver, Colorado:** Emrick & Hill Engine & Equipt. Co. • 4841 E. 38 St.
**Houston 2, Texas:** Oil & Gas Supply Company • 2525 San Jacinto St.
**Longview, Texas:** Cherco Equipment, Incorporated • P. O. Box 2229
**Pittsburgh 34, Pa.:** P. C. McKenzie Company • 3829 Willow Avenue



# Another Cost-Saving Triumph for Refrigerated Storage of Anhydrous Ammonia

The key to efficient, economical storage of anhydrous ammonia at the Mid-South Chemical Co., plant in Memphis, Tenn., is this refrigerated storage facility designed and built by CB&I.

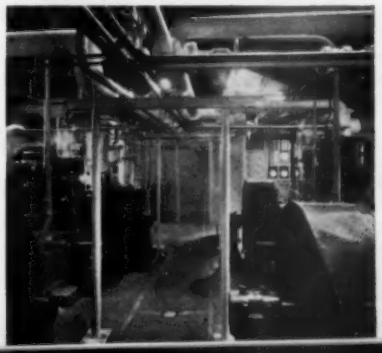
The economy of refrigerated storage facilities operating at atmospheric pressure (including operating and maintenance cost) has been proved many times in comparison with conventional pressure storage at ambient temperatures. Inherent safety features are built into the facilities.

This same economic benefit is available for "peak shaving" storage of liquefied petroleum gas and for gas production plants.

*Single Responsibility* is assured —from initial planning through all phases of designing, engineering, fabricating and constructing— when you choose CB&I to build your refrigerated storage facility.

As the leading designer of low-temperature storage facilities, CB&I has considerable information that can be of value to you. Write for Bulletin G-48. Chicago Bridge & Iron Company, 332 S. Michigan Ave., Chicago 4, Ill. Offices and subsidiaries throughout the world.

**The heart of the installation is a 106 ft. dia. double-wall insulated steel tank which stores 9,560 tons (80,000 bbls. water capacity) of anhydrous ammonia at about −27°F. and 0.5 psig. Conventional storage at ambient temperatures would require 136 high-pressure 30,000 gallon blimps. Control is automatic — provided by a combination pneumatic-electrical system.**

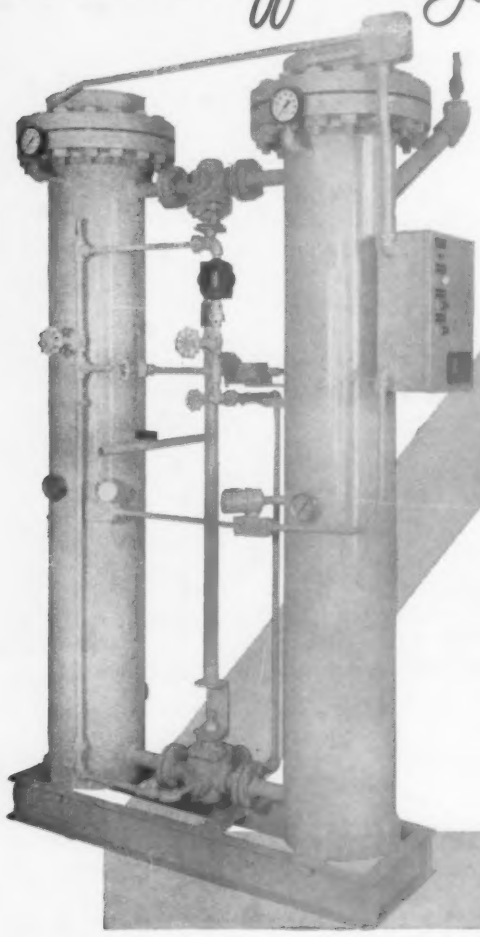


CB&I **built it!**

CB-6126

# KEMP ORIAD DESICCANT DRYERS

*cut costs, add efficiency 4 ways!*



**1 Complete reactivation**

An exclusive 3-zone embedded heater design gives every Kemp Oriad Desiccant Dryer extra drying power *economically* (effective distribution of heating elements assures high heat transfer efficiency). The most complete reactivation results... providing maximum desiccant capacity, minimum dewpoint performance.

**2 Full automatic operation**

Set the program timer and everything is regulated automatically. Gases are dried with the least pressure loss, lowest maintenance and operating costs. Your choice of manual or semi-automatic systems, too.

**3 Accurate temperature control**

Thermostatic control conserves heat input... maintains ideal temperatures for highest operating efficiency in drying instrument air, process air and gases to the lowest dew point, eliminating condensation or freeze-up, and other applications.

**4 No moving parts**

There are no blowers, fans or motors to create maintenance problems, rising operating costs. Unit comes fully assembled, ready to go. Liquid dryers also available. Write today for Bulletin D-103, or contact your Kemp man, listed in the Chemical Engineering Catalog.

*It always pays to come to*

**KEMP OF BALTIMORE**

**THE C. M. KEMP MANUFACTURING COMPANY**
**405 E. Oliver St., Baltimore 2, Md.**

Trans-Canada Pipe Lines Limited Chooses Worthington SUTC's . . .

# FOR FIRST FULL AUTOMATION

At central control, the dispatcher pushes a button. At the compressor station miles away, a solenoid throws an air valve. Engine and compressor cylinders begin purging . . .

At 6 seconds, ignition actuates, fuel is admitted and the engine slowly accelerates toward 160 rpm. At 20 seconds the compressor cylinders stop purging. In 5 minutes, the engine-compressor is ready to be brought on line.

This is a glimpse of normal operation of Trans-Canada Pipe Lines Limited's Maple Station—the first to be fully automated by this pipeline company. Three Worthington SUTC engine-compressors operate in pre-set sequences according to signals from the dispatcher who, though 25 miles away, could be a thousand.

These new SUTC's have a higher compression ratio for increased efficiency; improved handling of heat load through new computer-designed Turbo-Chargers; and new bearing construction. Cylinder parts and Double Deck valves were manufactured in Canada.

The station organization chart shows the benefit of these automated SUTC's. This station has no operators. This saves initial cost of four houses and salary and overhead for the operators.

For complete information on SUTC's for automated or conventional installations, call your nearest Worthington District Office. Or write Worthington Corporation, Dept. 43-22, Buffalo, New York. In Canada, Worthington (Canada) Ltd., Brantford, Ontario.

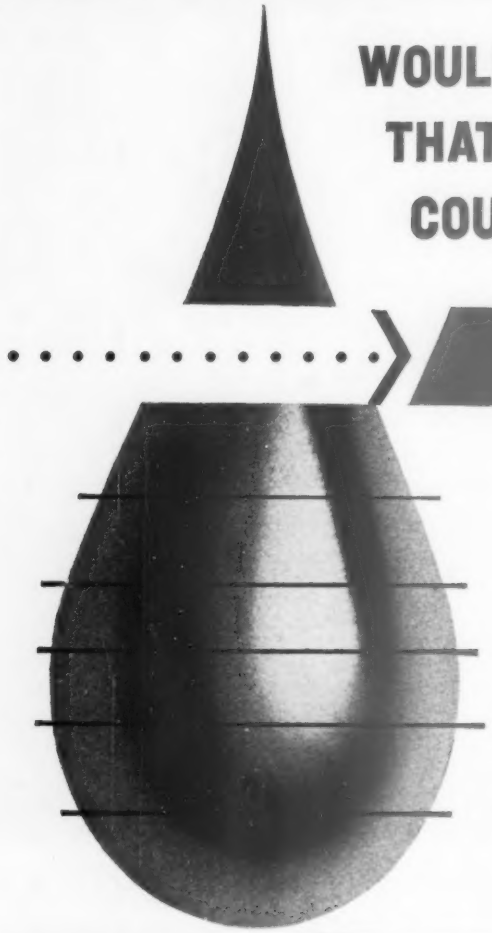
WORTHINGTON

PRODUCTS THAT WORK FOR YOUR PROFIT

# ENGINEERING

NEWS YOU CAN USE ABOUT ENGINE AND COMPRESSOR PERFORMANCE

## WOULD YOU BELIEVE THAT ONE DROP OF OIL COULD BE THIS IMPORTANT?



If a 12 cylinder, 2,000 HP, 330 RPM engine uses **ONE-EIGHTH OF A DROP** of additional oil per stroke in each cylinder, here's what will happen: your oil consumption will increase from 8000 BHP hours per gallon to 2000!

And that's the big reason Cook rings save you money. Like other oil control rings, Cook rings meter oil and properly spread it, but Cook rings do this in addition: *they prevent excessive use of oil!*

Don't just get oil wiper rings . . . get Cook *engineered* conformable oil wiper rings, the most copied oil control rings in the world!

## "IMPROVE YOUR PISTON RING PERFORMANCE"

### SEND FOR FREE 8-PAGE BOOKLET

Write for your free copy of this technical article. Gives valuable data on improving your engine's performance and keeping it high for longer periods by better cylinder sealing. Offers practical advice on (1) how to tell whether rings should be reused or replaced, (2) choosing a ring setup, (3) relieving top ring load, and other problems. In short, it's a brief, handy guide to better piston ring performance. For your copy, write C. Lee Cook Division, Dover Corp., 934 South 8th Street, Louisville 3, Kentucky.

## WRITE FOR COOK'S NEW PISTON RING CATALOG

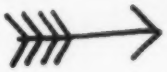
Sixteen-page catalog just off the press. Describes complete line of piston rings manufactured by C. Lee Cook Division, also the special seals and rings of the Airtomic Division. For your free copy, ask for Bulletin 610, C. Lee Cook Division, Dover Corp., 934 South 8th Street, Louisville 3, Kentucky.

C. LEE COOK

DIVISION OF DOVER CORPORATION

*Rings and Packings Since 1888*

MR. OIL MAN
meet the
NEW
EASTMAN*
OIL WELL SURVEY CO.
and see what it
can do for you!



"Symbol of Service"

*Trade name: Eastco.

# the new EASTMAN*

## RESEARCH AND DEVELOPMENT
***...to help you cut costs***

**Eastco** is dedicated to a continuous program of research and development on drilling tools and techniques...with the objective of saving you money by reducing drilling and production costs. (Full gauge deflection tools and techniques developed by Eastman are now in common use, resulting in large savings.)

## NEW PRODUCTS AND SERVICES
***...to help you do a better job at lower cost***

**Eastco** is developing and acquiring new products and services, all related to our specialty of drilling and production equipment and techniques...products and services which we are proving will help you do a better job at lower cost.

## TOP HANDS ALL AROUND
***...to give you dependable service***

The best available specialists form the staff of **Eastco**...in the field, in engineering, design, research, sales, and management. All top hands, to give you dependable service.

*Trade name: Eastco.

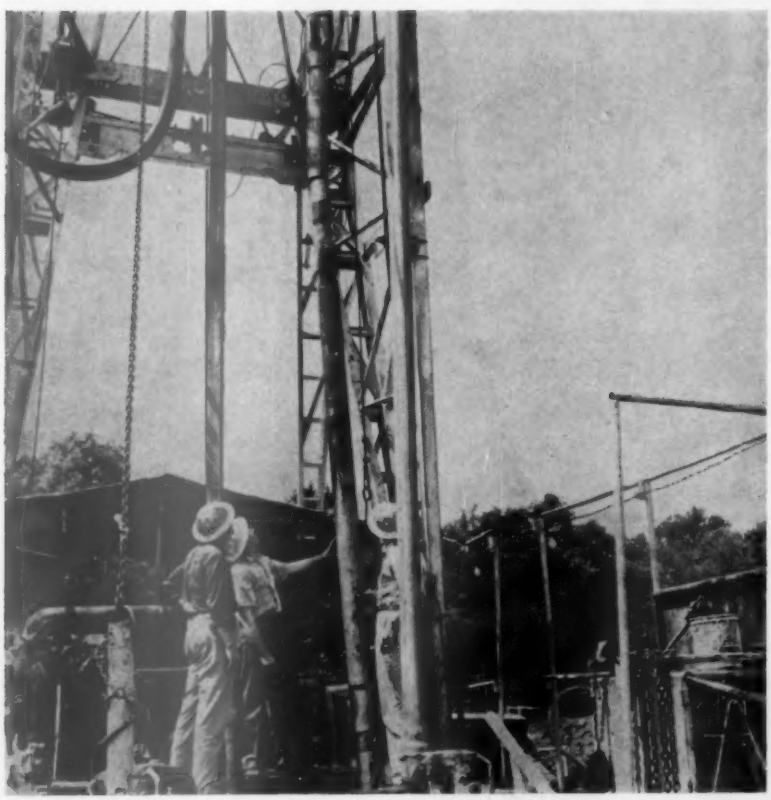
# R & D example:
# TURBO DIRECTIONAL DRILLING

*Eastco,* through extensive product research and field testing is determining the benefits and costs of turbo directional drilling when applied to various drilling problems.

Results obtained so far indicate that the Eastco technique of turbo directional drilling may be successful in reducing the time and cost of directional drilling.

If our continuing tests substantiate these results this technique will be made available to the industry...

**...a typical example of Eastco's approach to serving the petroleum industry through research and development.**



DIRECTIONAL DRILLING
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INSTRUMENTATION

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**EASTMAN OIL WELL SURVEY COMPANY**

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# GROVE G-6 REGULAR PORT VALVE
# SIMPLE—COMPACT—VERSATILE

**For Manifolds, Headers, General Pipeline service**

Now the proven Grove Seal-"O"-Ring® design is ready in a compact regular port gate valve. Round opening (1) assures flow characteristics superior to plugs. Double-barrier seal gives positive metal-to-metal contact (2) backed up by protected o-rings (3) to keep gate clean, smooth for fast open/close. Non-rising stem (4) and "designed-in" compactness achieve overall height of only 14⅜". G-6 Regular Port gate valves, like all Grove valves, do not rely on sealing compounds for bubble-tight shut-off, thereby eliminating costs relative to this maintenance. Ready now in 2" ASA 900 and 1500.

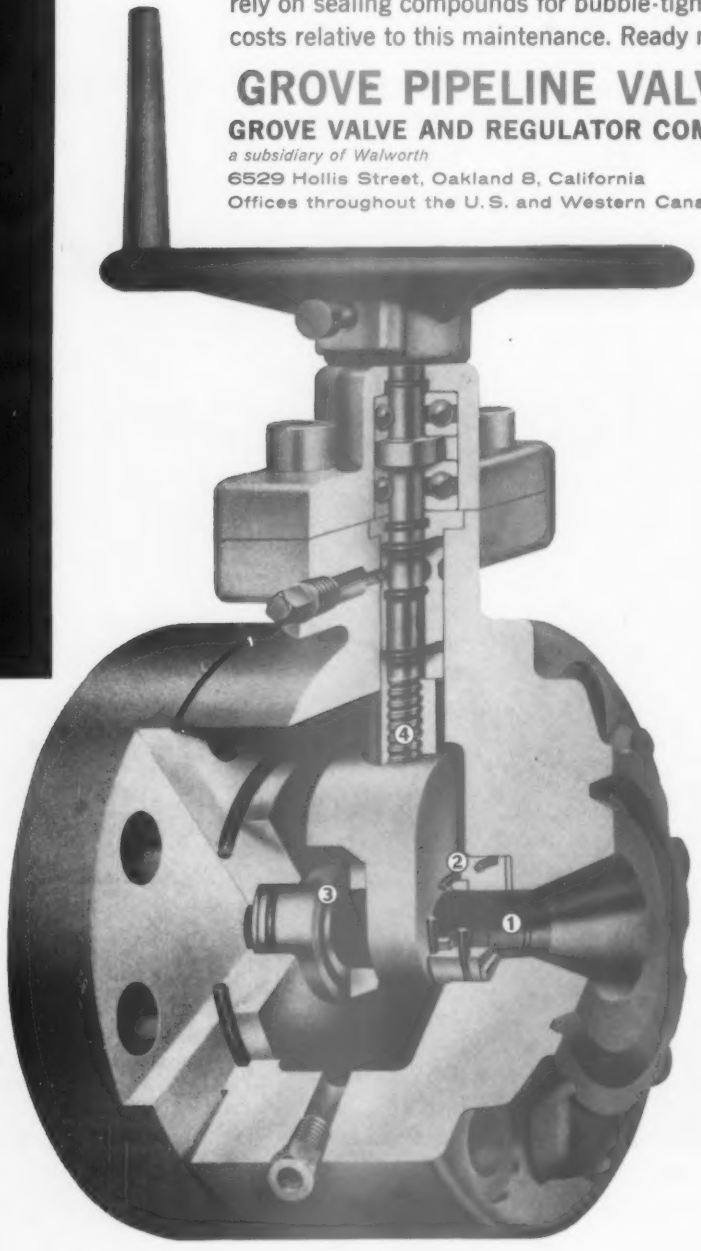
## GROVE PIPELINE VALVES

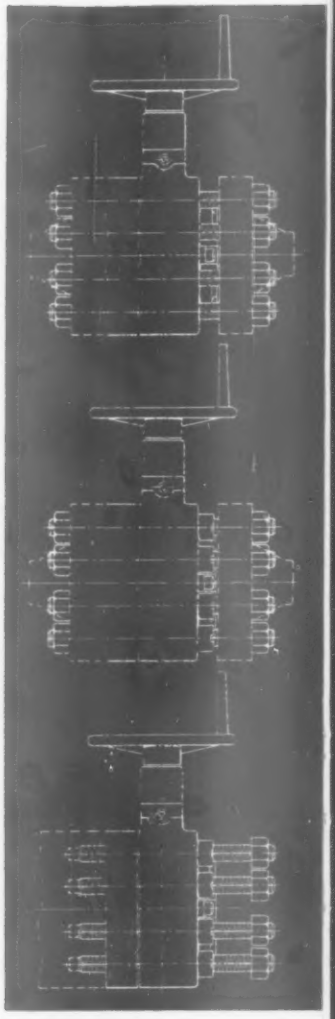
**GROVE VALVE AND REGULATOR COMPANY**

*a subsidiary of Walworth*

6529 Hollis Street, Oakland 8, California

Offices throughout the U.S. and Western Canada



7184

## Oil company reports PERFORMANCE PLUS with Sumitomo steel tubing

A leading drilling company in Texas reports that Sumitomo tubing far exceeded API specifications when run as drill string, despite 46 rugged round trips in and out of a 5700-ft. well under 1200 lb. mud pressure.

Performance like this shows why Sumitomo steel pipe and tubing, produced in accordance with API, ASTM and many other international standards, are exported in all sizes and grades to every major part of the world.

Available in API Standards in the following sizes:

Casing 4½" to 13⅜" O. D.
Tubing 1.660" to 4½" O. D.
Line Pipe 0.840" to 14.00" O. D.
High Test Line Pipe 6⅝" to 14.00" O. D.

*LEADING MANUFACTURER OF STEEL TUBES AND PIPE WIRE RODS AND ROLLING STOCK PARTS*

**SUMITOMO METAL INDUSTRIES, LTD.**

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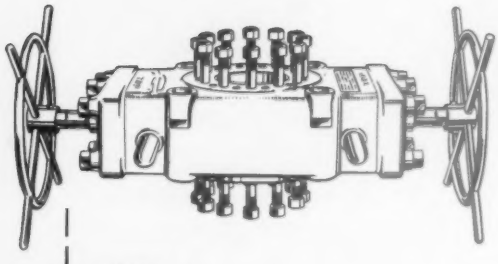
420 LEXINGTON AVENUE, NEW YORK 17, N.Y.

*Perfect for Work-over Rigs . . .*

# Guiberson BLOWOUT PREVENTER

## *with Chain Drive*



**TYPE A**
**BLOWOUT PREVENTER**
**MANUAL DRIVE**

- This work-over special is also ideal for small hole drilling.
- Chain drive provides tight seal with one man operation.
- Two types — A for working pressures to 3000 psi (6000 psi test) — 7⅜" opening. Manual or chain drive.

  B for working pressures to 2000 psi (4000 psi test)—9-1/16" opening. Chain drive only.
- Short and compact design — body is only 11½" high.
- Keeps well head equipment close to ground.
- Designed to use two preventers in combination without need of flanged adapters.
- Connecting tie bolts and nuts furnished at no extra cost on original sale of dual preventers.
- Universal slide designed to handle blank rubbers or 2", 2½", 3", 3½", 4" tubing sizes or 5½", 7" casing sizes.

*Better be Safe than Sorry — go Guiberson*

**THE GUIBERSON CORPORATION**
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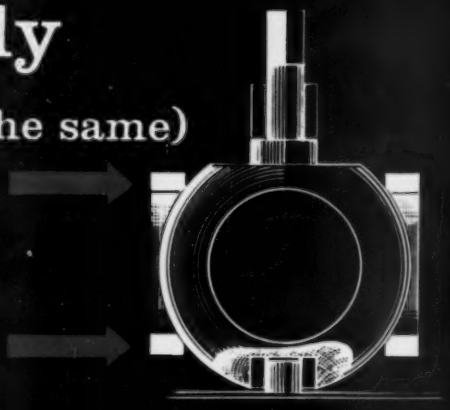
GUIBERSON — DRESSER INDUSTRIES INC.

PRODUCTION, DRILLING AND WORKOVER SPECIALTIES, MOLDED RUBBER PRODUCTS

OIL • GAS • ELECTRONICS CHEMICAL • INDUSTRIAL

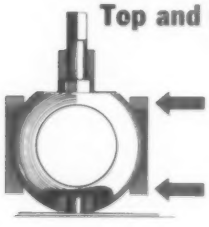
# Look closely

(not all ball valves are the same)



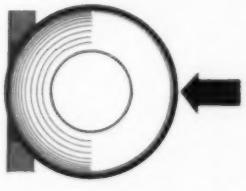
## . . . this top and bottom guided **FLO·BALL**® has revolutionized valving!

Only **FLO·BALL** has a top and bottom guided ball combined with top entry. These features, which give you best valve performance, make all other ball valves obsolete. **FLO·BALL** is the valve you will use today **and** for years to come. Only **FLO·BALL** offers all this at a competitive price.



### Top and Bottom Guided *FLO·BALL*

Unlike other ball valves, **FLO·BALL** seats do not serve as bearings. By putting the bearing loads where they belong — on frictionless Teflon bearings — the seat can then perform its basic sealing function. Result: longest seat life, lowest torque, in sizes through 36", pressures to 10,000 psi, temperatures from cryogenic (−423° F) to +500° F, for on-off and throttling.



### Floating Ball Valves

Other makes of ball valves put the crushing burden of bearing loads right on the fixed seats. This results in seat distortion, hard turning and short life.

*Fill in reverse side and mail today!*

For ultimate valve performance, specify FLO • BALL — no equal!

Business Reply Mail

No Postage Stamp Necessary if Mailed in the U.S.

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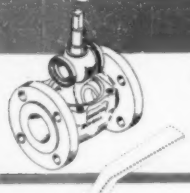
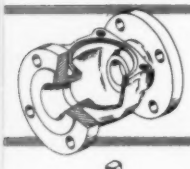
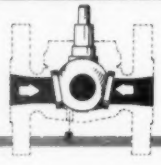
# Compare FLO·BALL® feature for feature
# ... there is no equal!

| | FLO-BALL | Ball Valve A | Ball Valve B | Ball Valve C | Ball Valve D | Ball Valve E | |
|---|---|---|---|---|---|---|---|
|  **1. TOP ENTRY** All internal parts can be removed and re-installed without removing valve from line. | √ | | | √ | | | |
| **2. TOP AND BOTTOM GUIDED BALL** Provides truly double seal, extends seat life. Makes for easy operation. | √ | | | | | | |
| **3. DOUBLE SEATS** Interchangeable and replaceable seats insure sealing in both directions; give double protection against leakage. | √ | √ | √ | √ | √ | √ | |
|  **4. FLANGES INTEGRAL WITH BODY** Rugged, one-piece body design gives greatest possible strength. | √ | √ | | √ | | | |
| **5. ONE PIECE BALL AND STEM** No possibility of separation of ball from stem. Always perfect alignment with zero backlash. Foolproofed for assembly. | √ | | | | | | |
|  **6. BLOCK AND BLEED** Top and bottom guided ball and floating seats provide simultaneous up-stream and down-stream seal . . . a true block and bleed valve. Block and bleed type available on special order. | √ | | | | | | |

## Specify the FLO • BALL for your application

| | SCREWED ENDS | FLANGED ENDS |
|---|---|---|
| Sizes | ⅛" — 2" | 1" — 36" |
| Pressures | Vacuum — 600 # — 3000 # | 150 # — 300 # — 600 # (ASA Rating) |
| Materials | Carbon Steel, Stainless Steels, Semi-Steel, Brass, Alloy 20, Monel | |
| Operators | Manual, Hydraulic and Motor | |
| Your Choice of FLO-BALL Types | Two-Way, Three-Way, Fire-safe, High Pressure (to 10,000 psi), Cryogenic, etc. | |

Gentlemen:

I am interested in getting complete information on FLO-BALL valves.

My application is_____

☐ *Send sales engineer* ☐ *Send literature*

Name_____ Title_____

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FLO-BALL

**Hydromatics, Inc.**

BLOOMFIELD, NEW JERSEY

*Fill in this card ... mail today!*

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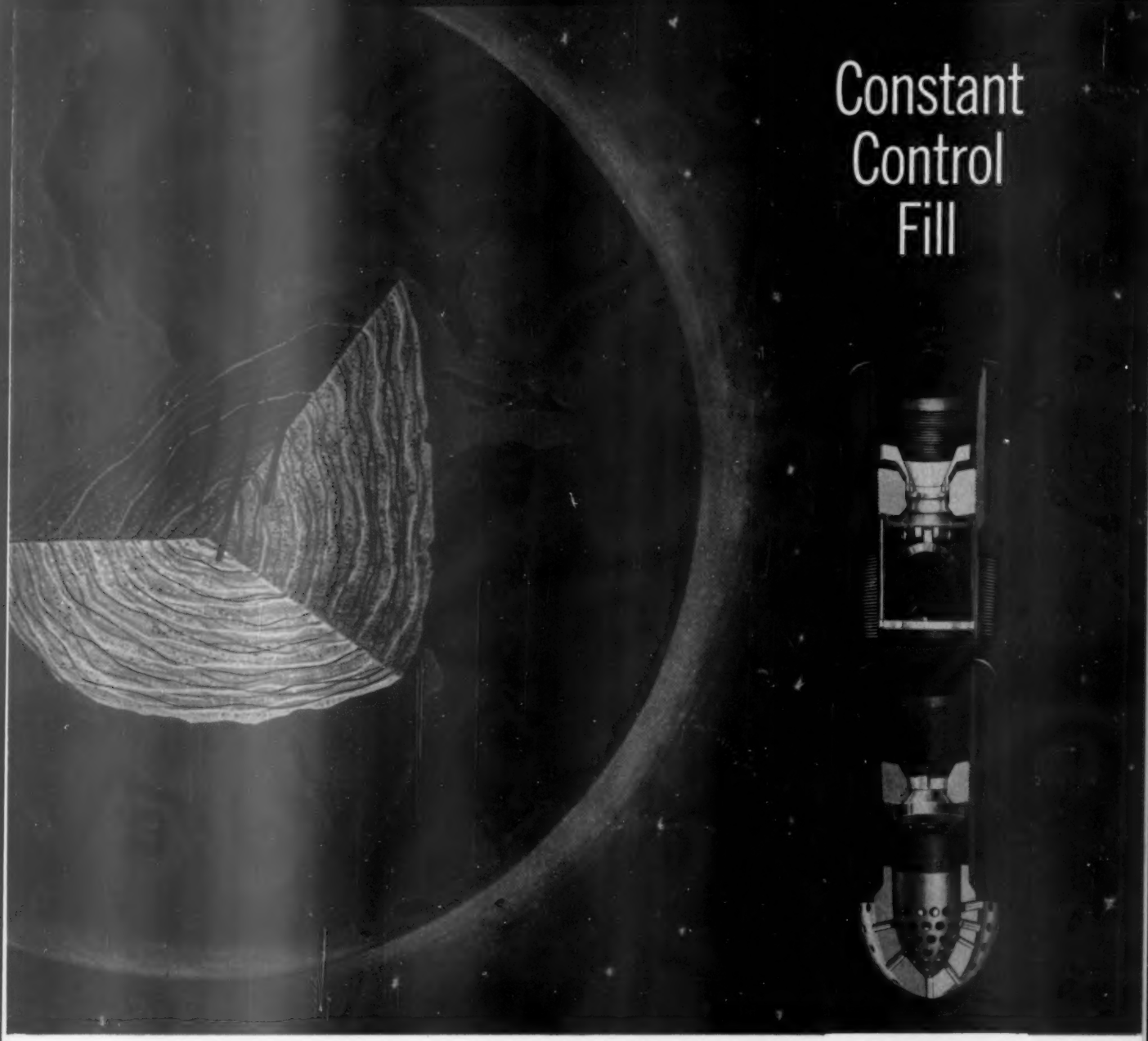


## RECORD BREAKING PERFORMANCE

### Rector Type "O" Cementing Equipment insures constant control under all conditions

Rector Type "O" cementing equipment delivers outstanding performance with safety, proven in routine operations or at the end of the longest casing string ever run — 25,340 feet under the ground. Rector Type "O" is the ONLY automatic casing fill-up equipment that permits circulating the well at your option, then continuing to run pipe with controlled orifice fill from the bottom. A new ceramic choke that can be changed in the field is available for overcoming orifice wear from abrasive sands and insuring constantly controlled operation. A bullet shaped aluminum screening nose guides the shoe past ledges and obstructions. Tests prove that lost circulation materials of all kinds can be circulated through the perforated nose without danger of plugging.

Rector Type "O" fill shoes and fill collars are precision machined from high quality seamless steel. Internal parts are high strength aluminum alloy and can be easily drilled. Specify Rector equipment in your next cementing program. See your favorite supply store — or ask a Rector man for details.

**Rector** WELL EQUIPMENT CO., INC.

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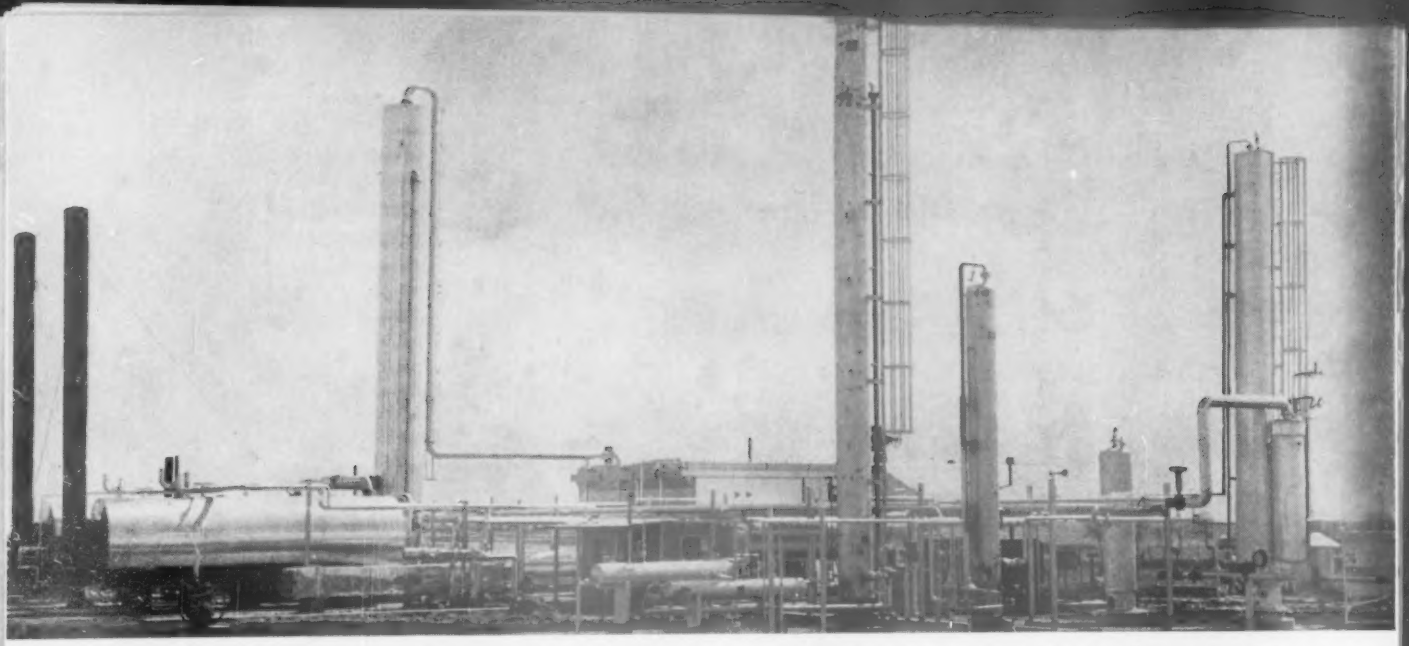
*Making the Oil Industry Safer*

Houston plant: 2215 Commerce Street Export representatives: Continental Supply Co., Mid-Continent Supply Co., Oil Well Supply Co.

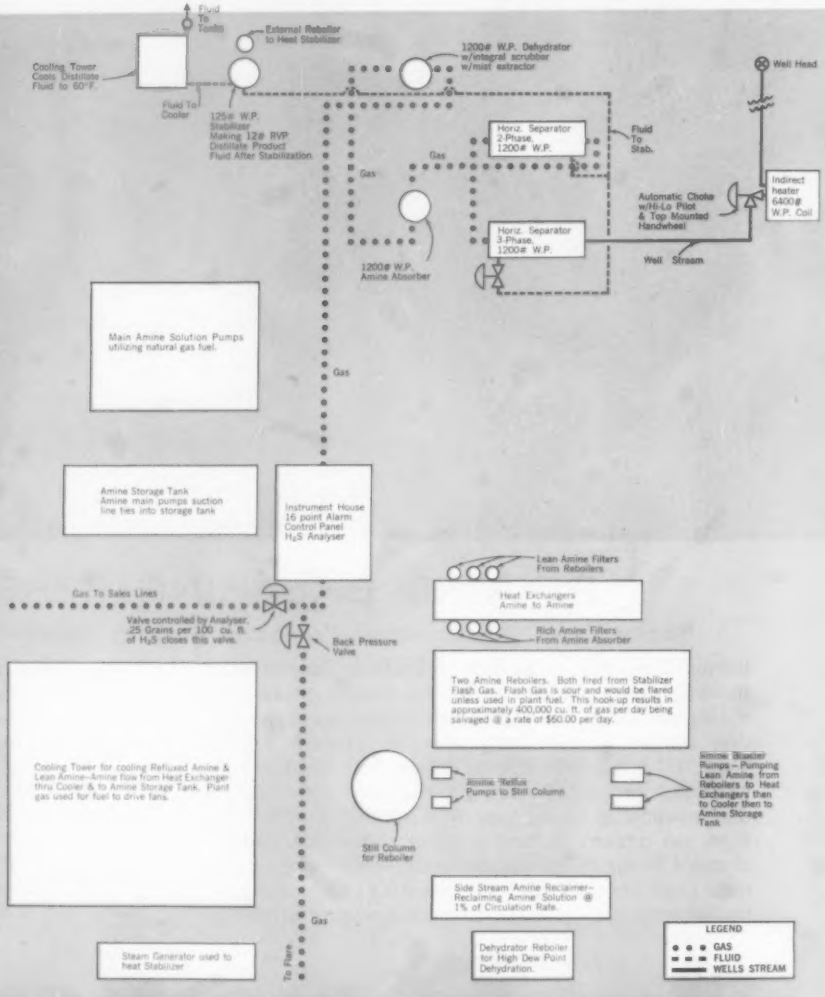


# DESULFURIZATION + DEHYDRATION + HYDROCARBON RECOVERY

## all-in-one package

This new Texas installation represents one of the most complete gas processing plants in America. The completed well was attractive from a hydrocarbon recovery standpoint, but the gas as it existed had no market value. The BS&B desulfurizing and dehydration processes enabled the operator to convert a valueless asset into a profitable venture.

This gas processing plant is a BS&B installation throughout, including galvanized bolted storage. It represents the kind of leadership which has become synonymous with BS&B. If you have plans for gas processing it would pay you to consult your BS&B representative.


Fluid To Tanks
External Reboiler to Heat Stabilizer
Cooling Tower Cools Distillate Fluid to 60°F.
Fluid To Cooler
125# W.P. Stabilizer Making 12# RVP Distillate Product Fluid After Stabilization
1200# W.P. Dehydrator w/integral scrubber w/mist extractor
Well Head
Horiz. Separator 2-Phase, 1200# W.P.
Fluid To Stab.
Gas
Gas
Automatic Choke w/Hi-Lo Pilot & Top Mounted Handwheel
Indirect heater 6400# W.P. Coil
Horiz. Separator 3-Phase, 1200# W.P.
Well Stream
1200# W.P. Amine Absorber
Main Amine Solution Pumps utilizing natural gas fuel.
Gas
Amine Storage Tank Amine main pumps suction line ties into storage tank
Instrument House 16 point Alarm Control Panel $H_2S$ Analyser
Lean Amine Filters From Reboilers
Heat Exchangers Amine to Amine
Gas To Sales Lines
Valve controlled by Analyser. .25 Grains per 100 cu. ft. of $H_2S$ closes this valve.
Back Pressure Valve
Rich Amine Filters From Amine Absorber
Two Amine Reboilers. Both fired from Stabilizer Flash Gas. Flash Gas is sour and would be flared unless used in plant fuel. This hook-up results in approximately 400,000 cu. ft. of gas per day being salvaged @ a rate of $60.00 per day.
Cooling Tower for cooling Refluxed Amine & Lean Amine-Amine flow from Heat Exchanger thru Cooler & to Amine Storage Tank. Plant gas used for fuel to drive fans.
Amine Reflux Pumps to Still Column
Still Column for Reboiler
Amine Booster Pumps – Pumping Lean Amine from Reboilers to Heat Exchangers then to Cooler then to Amine Storage Tank
Side Stream Amine Reclaimer–Reclaiming Amine Solution @ 1% of Circulation Rate.
Gas
To Plant
Steam Generator used to heat Stabilizer
Dehydrator Reboiler for High Dew Point Dehydration.
LEGEND
GAS
FLUID
WELLS STREAM

**DESIGN SPECIFICATIONS**
Design capacity—7.5 million ft. in winter
5.0 million ft. in summer
1200# W.P. design
Well flowing pressure — 2750 psi.
Inlet temperature — 95° F.
Total Acid Gas Content 9.72%

**GAS SALES SPECIFICATIONS**
Sulphur content—.25 grains per 100 SCF
Water content—7#/MMSCF

**PLANT PERFORMANCE**
Average $H_2S$ content — .03 grains per hundred SCF.
(The $H_2S$ content has never exceeded .04 grains per hundred SCF.)
Hydrocarbon recovery—72.5 BBLs of 12# RVP product per MMSCF.

BS&B

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The Supply Industry places this great inventory at your disposal — at over 1000 store locations throughout the oil country. ■ No one can question that the Petroleum Industry profits from this inventory and its availability. It should also be recognized that the avenues to this profit cannot be kept open unless the Supply Industry, too, is allowed to realize a reasonable profit. ■ Those Supply Companies which conduct their affairs now in a manner which will enable them to serve you in the future, need and deserve your support.

**LARKIN PACKER COMPANY**
DIVISION KOEHRING COMPANY
WAXAHACHIE, TEXAS

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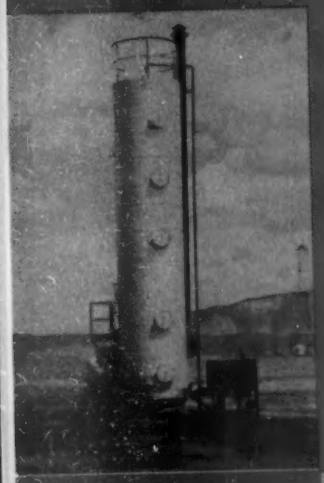
...Through Your Supply Store

LARKIN LEADERSHIP HAS BEEN EARNED BY YEARS OF DEPENDABLE PERFORMANCE

# CONTINENTAL-EMSCO ANNOUNCES

# CONTINENTAL

## A NEW HIGH IN SERVICE AND EQUIPMENT FOR OIL-TREATING



# HOIL

Now, for the first time, you can have oil-treating equipment that's designed, made, sold, and serviced by an integrated supply company. Since Hoil Equipment has joined the growing Continental team, you can have a single source of responsibility for your entire production package — from subsurface pump through LACT . . from engineering and quality control through installation and servicing.

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. . is backed by trained personnel through teams of engineers, specialists and service men available from more than 135 Continental locations.

. . offers flexibility of sizes and capacities to meet oil-treating requirements at highest efficiency.

. . lowers oil-treating costs with unitized, skid-mounted, prepiped, individualized units.

***Whatever you need in oil-treating equipment... Continental's got it...worldwide***

- Two-Stage Down-Flow Treating Systems
- Fluid-Packed Design, Horizontal U-Flow, Economy and Vertical Heater-Treaters
- Production Testers
- Freewater Knockouts
- Oil Skimmers
- Water Filters
- Miscellaneous Pressure Vessels
- Line Heaters
- Prover Tanks
- Gas Gard®
- Gage It

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H₂OIL
OIL TREATING SYSTEMS

# CONTINENTAL EMSCO

CONTINENTAL-EMSCO COMPANY, a Division of
The Youngstown Sheet and Tube Company
General Offices: Dallas, Texas
Export Office: New York, New York

# THEY SAY

## We'd like to, but—

Dear Sir:

We enjoy your publication but are disappointed that you do not publish in your price quotations the latest posted prices for propane from the Group 3 area and from the Baton Rouge area.

If at all possible it would be of great help to us if you would publish these prices in future issues.

W. B. Gunn
Secretary and Treasurer
Shengas Corp.
Harrisonburg, Va.

*This is mainly a problem of finding space for more pricing figures. Expansion and improvement of the Journal's pricing services are being considered by the editorial staff, however—Ed.*

## It deserves more room

Dear Sir:

Why relegate such a fine argument (OGJ, Oct. 16, "Lucky gas users," p. 53) to Journally Speaking when it deserves more than editorial space? . . . Excellent theme.

H. H. Kaveler
Tulsa

## Taxes offset technology

Dear Sir:

I have just come across your penetrating editorial of September 18 in which you lament the State of Pennsylvania's gasoline sales as affected by sales tax ("Gasoline tax bucks diminishing returns," p. 55).

I had occasion just this week, in discussing percentage depletion, to remark to astonished students that ⅓ of the price of fuel is tax. The remaining 20 cents is only slightly higher than the retail price of gas which existed 25 years ago.

This is indeed a tribute to the skill and ingenuity of petroleum management and employes. How regrettable that in the face of such progress in production, refining, and distribution processes, which has kept basic fuel costs relatively low (particularly in the face of the price inflation of the past 20 years), the motorist is unable to reap the benefits thereof.

There is a theoretical limit to the ability of mortal man to achieve the


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Special report to users of Caterpillar D7, D8 and D9 Tractors:

CAT CATERPILLAR

Parts you can trust
...cost less per hour

# New Piston and Ring Combination Cuts Oil Consumption 33-50% ...Lasts Hundreds of Hours Longer!

What makes it so different? Look at the two Caterpillar-made pistons. Notice in the new design that *both* compression rings are now deeply seated in grooved cast iron (indicated in yellow) instead of only the top ring. Since cast iron is able to resist groove "pound out," both compression rings are held firmly *longer* in the correct position for maximum ring-to-liner sealing. Compression loss and blow-by *behind* rings and around grooves is delayed hundreds of hours, too.

The new intermediate compression ring is a "twist" ring, so-called because it changes position in the groove during the power stroke. It actually "twists" so its face has *greater sealing area* at the liner than regular rings—reducing the number of compression rings normally required. At the same time, it thins the film of oil left by the regular oil control ring. This leaves less oil to burn away which contributes to the new piston's better oil control and longer ring life.

All rings now have a new look, too . . . *each and every* face is thickly chrome plated against wear. They are also "bright lapped" to such brilliance that any flaws can be easily seen and the faulty ring rejected. Such quality control assures almost perfect seating right from the start, eliminating break-in blow-by, slobbering and scuffing.

Cost? Pistons with the *extra* cast iron bands cost *slightly more*, but ring sets are less! Once you change over, your tractor maintains its power longer, your fuel and oil bills go down, and your next set of replacement rings will be less. Your Caterpillar Dealer has them in stock now.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

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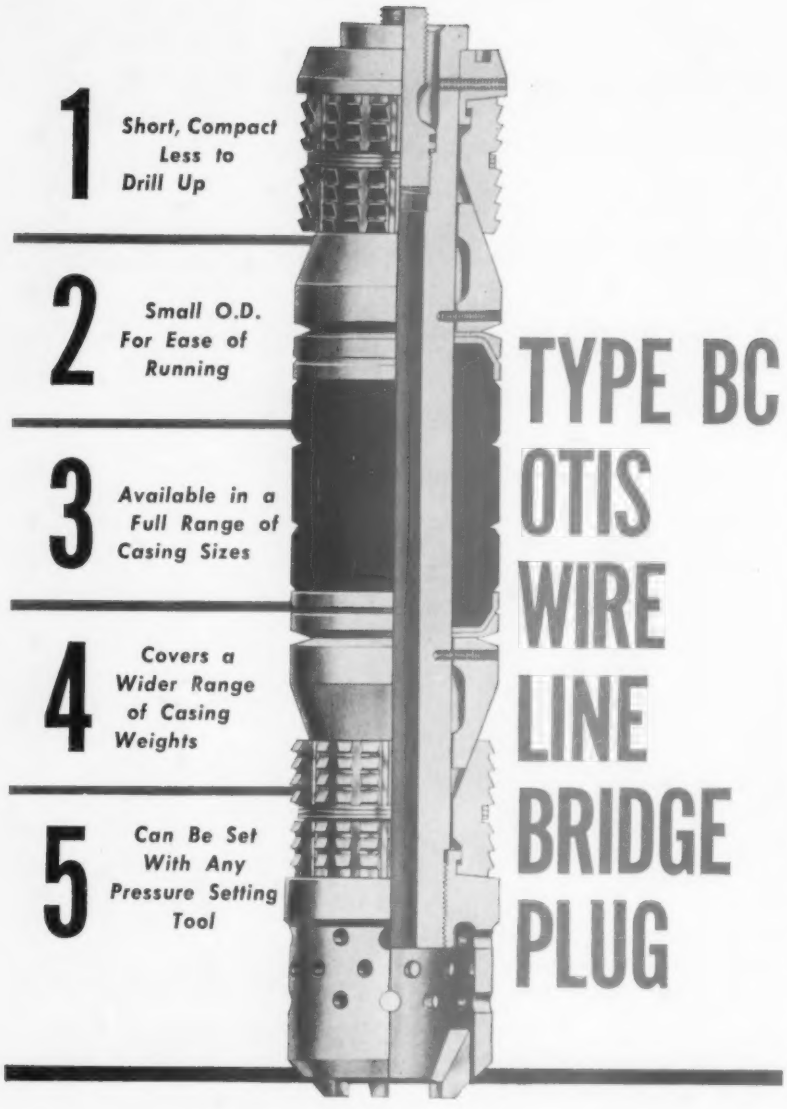

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4 Covers a Wider Range of Casing Weights

5 Can Be Set With Any Pressure Setting Tool

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Every time you specify the Type BC Otis Wire Line Bridge Plug, you get *5 plus features* designed to help you take the guesswork out of your plugging operations — and yet the plug costs you no more than an ordinary plug. For this reason, many operators have standardized on the Type BC. They found they could successfully run the Type BC where other plugs failed to get down. In addition to the 5 big advantages you get with a Type BC Bridge Plug, you will find it's available from leading electric line service companies and stocked in over 200 different field locations. Take the guesswork out of your plugging operations — the next time you need a bridge plug, specify Otis. © 1961 O.E.C.

**Type BC Otis Wire Line Bridge Plugs are available in these sizes:**

| SIZES | CASING WEIGHTS | SIZES | CASING WEIGHTS |
|---|---|---|---|
| 2⅞" | 6.4 — 8.6 lb. | 5½" | 13 — 20 lb. |
| 4½" | 11.6 — 15.1 lb. | 6⅝" | 17 — 24 lb. |
| 4½" | 9.5 lb. | 7" | 20 — 38 lb. |
| 5" | 18.0 lb. | 9⅝" | 43.5 — 53.5 lb. |

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*Branches Throughout The Oil Country*


lowest possible costs through maximum production efficiencies. On the other hand, the capacity and taxing propensities of governments are limitless.

Theodore L. Humes
Instructor in Economics
Seton Hall College
Greensburg, Pa.

## New trade rules needed

"The vital area of our foreign policy concerning trade agreements and tariffs must be reexamined and placed on a truly reciprocal basis if American industry is to compete, not only with our opponents, but also with our firends."

*John E. Swearingen, president, Standard Oil Co. (Ind.), in a speech to the Texas Mid-Continent Oil and Gas Association.*

**Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.**

## CALENDAR

**NOVEMBER**

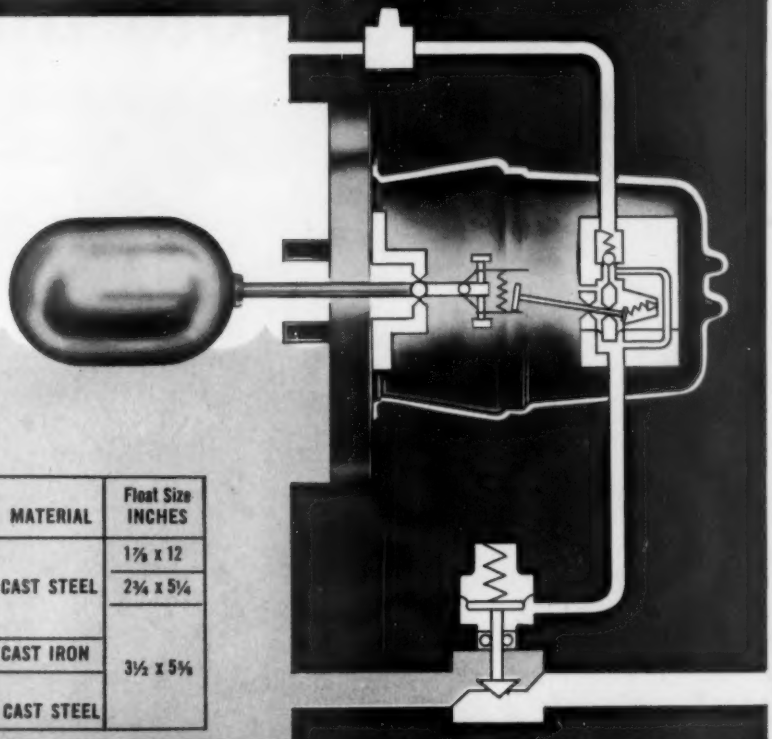
**5-9** Society of Exploration Geophysicists, international meeting, Denver.
**6-8** Chemical Institute of Canada, conference of the chemical engineering division, Royal York Hotel, Toronto.
**8-11** National Oil Jobbers Council, meeting, Morrison Hotel, Chicago.
**9-10** Society of Automotive Engineers, national fuels and lubricants meeting, Shamrock-Hilton Hotel, Houston.
**13-15** American Petroleum Institute, forty-first annual meeting, Conrad Hilton, Congress and Palmer House hotels, Chicago.
**15-17** University of Texas, Department of Petroleum Engineering, natural gas engineering conference, Austin.
**16** Illinois Oil and Gas Association, annual meeting, Mount Vernon, Ill.
**17** Natural Gas Processors Association, Panhandle Plains regional meeting, Herring Hotel, Amarillo, Tex.
**26-Dec. 1** American Society of Mechanical Engineers, winter annual meeting, Statler-Hilton Hotel, New York City.
**27-Dec. 1** National Association of Corrosion Engineers, southeast region conference and Florida general conference short course, Key Biscayne Hotel, Miami.

**DECEMBER**

**3-6** American Institute of Chemical Engineers, annual meeting, New Yorker Hotel, New York City.
**4** AIME's Society of Petroleum Engineers, Arizona section, annual meeting, Pioneer Hotel, Tucson.
**4-6** Interstate Oil Compact Commission, annual meeting, Denver Hilton Hotel, Denver.
**5-6** National Petroleum Refiners Asso-

Fisher Introduces a Line of Inexpensive Float Actuated

# LEVEL CONTROLLERS



**SERIES 2810**

| TYPE NO. | Vessel Nozzle CONNECTIONS | MATERIAL | Float Size INCHES |
|---|---|---|---|
| 2810 Electric Snap-Acting | 2" NPT | CAST STEEL | 1⅞ x 12 |
| | 3" NPT | | 2¾ x 5¼ |
| 2811 Pneumatic Snap-Acting | 4" Grooved | | 3½ x 5¼ |
| | 4" 125# ASA Flg. | CAST IRON | |
| 2812 Pneumatic Throttling | 4" 150, 300, & 600# ASA Flg. | CAST STEEL | |

## *for the tough jobs in OIL PRODUCTION*

Here are three low cost liquid level controllers incorporating either electric (explosion-proof), pneumatic snap or pneumatic throttling action. Type 2810 snap-acting controller uses a single pole, double throw Micro switch suitable for 20 amperes at 125 volts A.C. of noninductive current. Minimum snapping band of ¼" level change—maximum snapping band of 7 5/16" level change. Type 2811 has minimum snapping band of 2" level change—maximum snapping band of 7 5/16" level change. Type 2812 with a standard float and float arm will produce a 3 to 15 psi signal change with one spring or 6 to 30 psi signal change for the other spring on a level change of 2 13/16". Action of all controllers reversible. Each pilot type is interchangeable on the same float housing assembly. Stab-in type of tank mounting makes installation an easy matter.

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Made with sturdy gray iron or super-rugged cast-steel housings. Adapter mounting types for shafts from 1 7/16" to 10½" and direct-shaft mounting types for shafts from 1.7717" to 11.0236". Choice of rugged steel, multi-labyrinth or Dacron-contact seals.

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The reason? *More rollers, larger rollers!* Bearing capacity depends primarily on effective roller Length, roller Diameter and Number of rollers (L x D x N). And Link-Belt offers the *largest effective roller complement* for all sizes of spherical roller bearings . . . rated according to accepted formulas of the Anti-Friction Bearing Manufacturers Association. This increase in LDN values provides extremely high capacity . . . and in users' evaluation, it adds up to far longer bearing life.

## GREATER DURABILITY!

With balanced proportion design, Link-Belt spherical roller bearings possess durability characteristics that exceed the bearing industry's exacting requirements. Optimum balance of rollers, inner and outer rings must be obtained for increased bearing capacity . . . yet overall bearing dimensions must conform to an established international standard boundary plan.

Wrap-around, completely contoured retainers also contribute to durability through positive roller guidance and spacing. Precision-machined of centrifugally cast bronze, these husky retainers are far stronger than stampings or sand castings.

## GREATER PRECISION!

Link-Belt spherical roller bearings are made in the world's most modern bearing plant . . . with the most-advanced tools and techniques known to industry. A rigid quality control program leaves *nothing* to chance. Each Link-Belt bearing is subjected to *758 actual inspections*. Microsmoothness and precision are continuously scrutinized by automatic machines. Result: these bearings have been specified by leading manufacturers of cranes, shovels, graders, vibrating screens, and steel mill, paper mill and foundry equipment . . . and for high-precision applications such as embossing rolls, printing presses and torque converters.

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ciation, computer conference for refiners, Hotel Tulsa, Tulsa.

**JANUARY**

7-10 Pipe Line Contractors Association, annual convention, Boca Raton Hotel and Club, Boca Raton, Fla.

8-12 Society of Automotive Engineers, annual meeting, Cobo Hall, Detroit.

16-18 Kentucky Petroleum Marketers Association, annual meeting and convention, Brown Hotel, Louisville, Ky.

17-19 National Association of Corrosion Engineers, Canadian region eastern division conference, King Edward Hotel, Toronto.

19 Natural Gas Processors Association, Gulf Coast regional meeting, Robert Driscoll Hotel, Corpus Christi, Tex.

24-26 American Society of Mechanical Engineers, second symposium on thermophysical properties, Princeton University, Princeton, N. J.

31-Feb. 1 National Petroleum Refiners Association, Gulf Coast regional meeting, Ben Milam Hotel, Houston.

**FEBRUARY**

4-7 American Institute of Chemical Engineers, national meeting, Statler Hotel, Los Angeles.

14-17 Pipe Line Contractors Association of Canada, Castle Harbor Hotel, Bermuda.

15-17 Southwestern Legal Foundation, annual institute on the law of oil, gas, and taxation, Southwestern Legal Center, Dallas.

16 Natural Gas Processors Association, South Louisiana regional meeting, Lafayette Petroleum Club, Lafayette.

18-22 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, New York City.

22 Chemical Institute of Canada, protective coatings division, Seaway Hotel, Toronto.

23 Chemical Institute of Canada, protective coatings division, Windsor Hotel, Montreal.

27-Mar. 2 International Oil and Gas Educational Center, institute on economics of the gas industry, Southwestern Legal Center, Dallas.

28-Mar. 2 American Petroleum Institute, Division of Production, southern district meeting, Rice Hotel, Houston.

**MARCH**

1-2 Southwestern Legal Foundation, conference on economics of gas industry, Southwestern Legal Center, Dallas.

2 Ohio Oil and Gas Association, winter meeting, Deshler Hilton Hotel, Columbus, Ohio.

4-8 American Society of Mechanical Engineers, gas turbine-process industries conference, Shamrock Hilton Hotel, Houston.

6-7 National Petroleum Refiners Association, eastern regional meeting, Sheraton-Cleveland Hotel, Cleveland.

15-16 Society of Petroleum Engineers of AIME, economics and valuation symposium, Dallas.

16 Natural Gas Processors Association, Oklahoma regional meeting, Sheraton-Oklahoma Hotel, Oklahoma City.

19-22 Kentucky Petroleum Marketers Association, management institute conducted by the University of Louisville, Brown Hotel, Louisville, Ky.

21-23 New England Gas Association, annual meeting, Statler-Hilton Hotel, Boston.

21-23 American Petroleum Institute, Division of Production, southwestern

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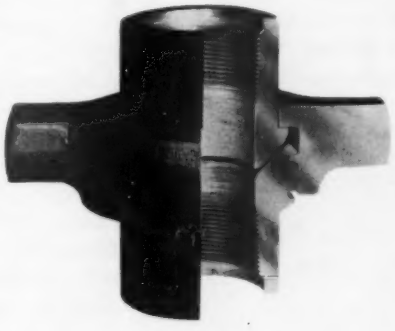

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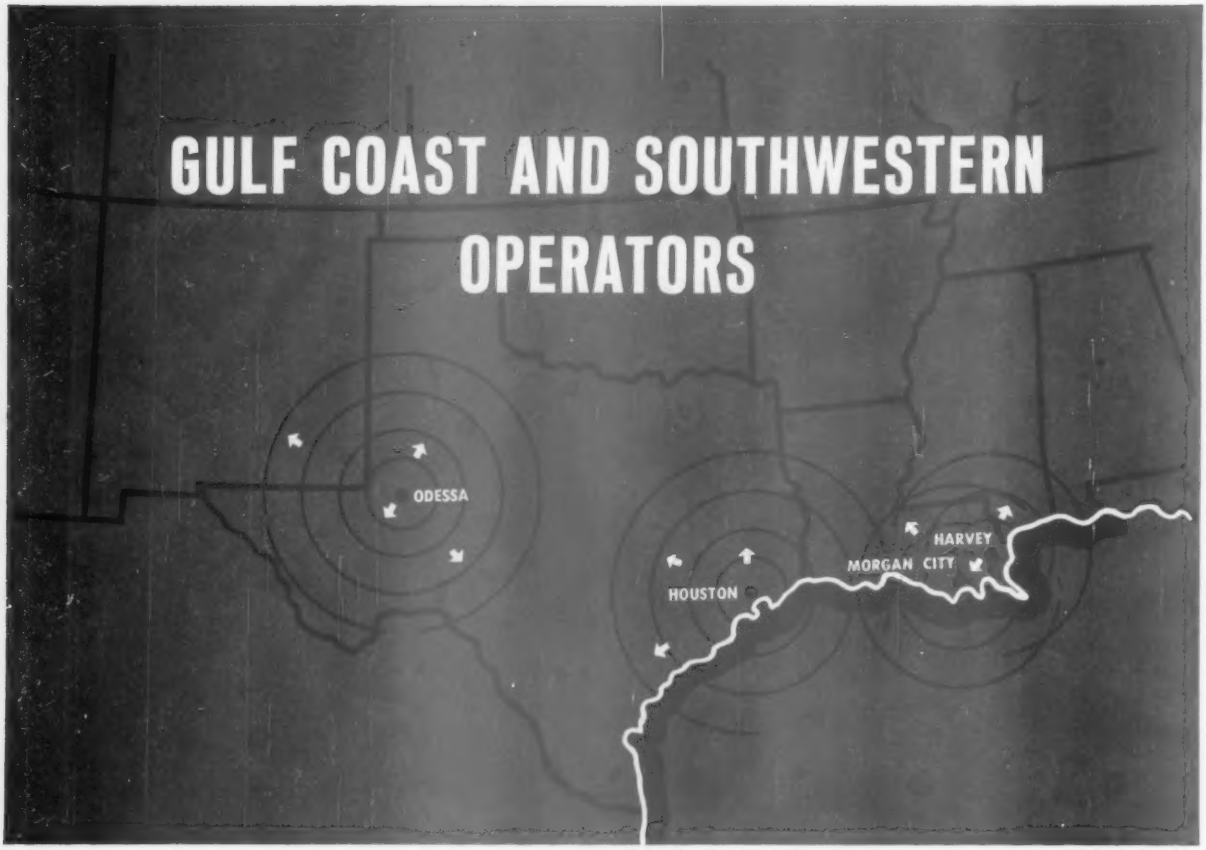


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Many operators now keep their capital investment in tubing inventory low by purchasing locally from supply stores or mill stock, in quantities to meet only current needs. Usually an operator's inventory can be smaller if he can have his tubing coated quickly at a nearby plant. Such minimum-investment purchasing is especially practical for most Gulf Coast and Permian Basin operators because four conveniently located Plastic Applicators' plants at Harvey and Morgan City, Louisiana, and Houston and Odessa, Texas, give them quick delivery.

The strategic locations of these plants also help operators keep their freight costs low. (An added convenience is the full range of in-plant inspection services for new and used pipe offered by Plastic Applicators' Pipe Inspection Division. Money-saving combination coating-and-inspection rates are available)

Call a nearby Plastic Applicators plant or sales office today for the complete story on how Plastic Applicators' conveniently located plants and on-time deliveries can help you cut costs.

**LOCATIONS:**

**Main Office:** *7020 Katy Road, P. O. Box 7631, Houston, Tex., UN 9-3611. Plants: Harvey and Morgan City, La. Houston and Odessa, Tex.*

**Sales Offices:** *Midland and Corpus Christi, Tex.; Hobbs, N.M.; Tulsa, Okla.; Houma, Lafayette, New Orleans, and Shreveport, La.; Jackson, Miss.*

BETTER COATINGS THROUGH RESEARCH

**PLASTIC APPLICATORS, INC.**

district meeting, Lincoln Hotel, Odessa, Tex.

26-29 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, joint annual meeting, Fairmont Hotel, Civic Auditorium, San Francisco.

27-29 American Society of Mechanical Engineers, power conference, Sherman Hotel, Chicago.

**APRIL**

2-4 National Petroleum Refiners Association, annual meeting, Granada Hotel, San Antonio.

3 Chemical Institute of Canada, chemical economics division conference, Royal York Hotel, Toronto.

4-6 API, Division of Production, Mid Continent district meeting, Sheraton Oklahoma Hotel, Oklahoma City.

5-6 Society of Petroleum Engineers of AIME, upper Gulf Coast region, drilling and production practices conference, Beaumont, Tex.

9-10 Instrument Society of America, national chemical and petroleum instrumentation symposium, Wilmington, Del.

9-11 Mid-West Gas Association, annual meeting, Hotel Radisson, Minneapolis.

9-12 National Oil Fuel Institute, national oil heat and air conditioning exposition, Chicago.

11-12 Petroleum Industry Electrical Association and Petroleum Electric Supply Association, convention and exposition, Dallas.

11-13 API, Division of Production, Rocky Mountain district meeting, Hilton Hotel, Denver.

12-13 Society of Petroleum Engineers of AIME, production research symposium, Tulsa.

14-18 Petroleum Equipment Suppliers Association, annual meeting, Boca Raton Hotel, Boca Raton, Fla.

15-18 American Society of Mechanical Engineers, oil and gas power division conference, Shoreham Hotel, Washington.

17 Society of Plastics Engineers, Philadelphia section, regional technical conference, Sheraton Hotel, Philadelphia.

17-19 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.

17-19 American Society for Metals, regional conference and exhibition, materials and materials processing for the petroleum, petrochemical and chemical industries, Shamrock Hilton Hotel, Houston.

23-25 American Association of Petroleum Geologists, Rocky Mountain section annual meeting, Salt Lake City.

24-26 American Society of Mechanical Engineers, production engineering conference, Van Curler Hotel, Schenectady, N. Y.

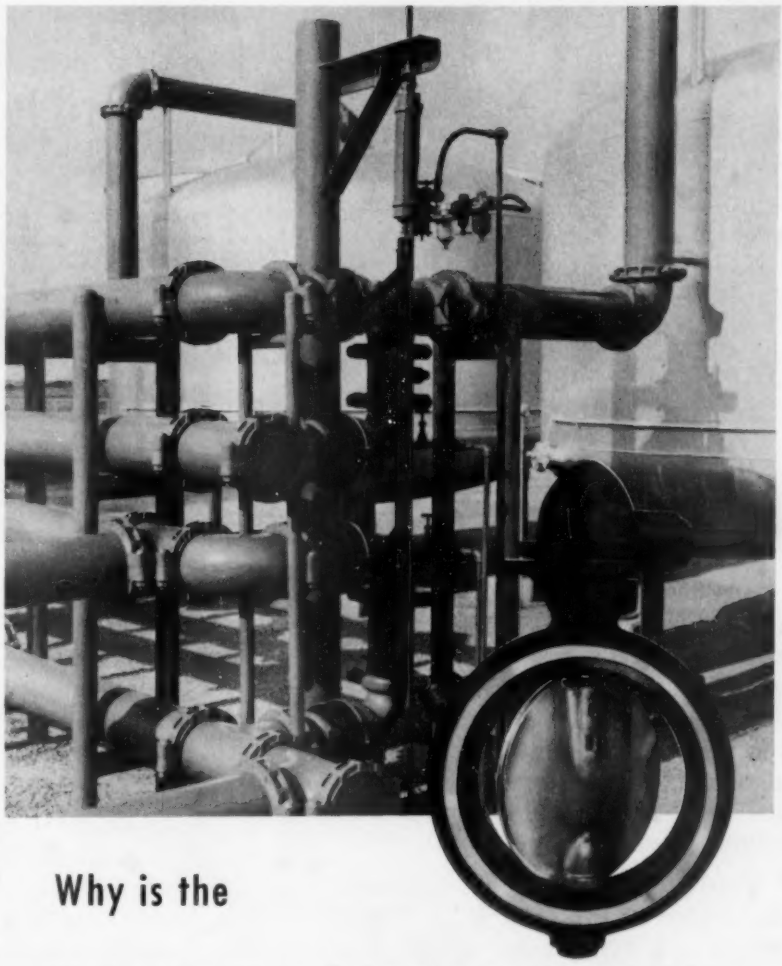
25-27 Natural Gas Processors Association annual convention, Hilton Hotel, Denver.

29-May 1 Independent Petroleum Association of America, midyear meeting, Hotel Muehlebach, Kansas City.

29-May 1 Empire State Petroleum Association, spring convention, Statler-Hilton Hotel, Buffalo, N. Y.

29-May 2 Liquefied Petroleum Gas Association, annual convention and trade show, Conrad Hilton Hotel, Chicago.

29-May 2 Southern Gas Association, annual meeting, and American Gas Associa-

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**DEMCO BUTTERFLY VALVE**
**seen on more waterflood installations?**

For the same reason that this field-proven Demco valve is appearing more and more in all kinds of drilling, producing and pipe line applications—all over the country. *The Demco Butterfly Valve offers so many operational and design advantages not found in other valves.*

This versatile valve uses less space, is non-directional, requires no lubrication, has low resistance to flow, is highly resistant to corrosion and is easily repaired in the field. And the initial cost is low.

It will pay you to investigate these valves for your next job, whether it be a production manifold, tank battery, LACT unit, waterflood or any job in which air, gas, water, oil or slurries are being handled. Suited for pressure ranges from 175 psi W.P. to 28" vacuum.

Available through supply stores everywhere.

**DRILLING EQUIPMENT MANUFACTURING CO.**

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DEMCO

# "Our Ford Trucks save us 2.3¢ per mile"

*says Mr. R. M. Johnson, Vice President, Cosden Petroleum Corporation, Big Spring, Texas*

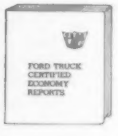
"Our latest six-month truck operating expense summary shows that Ford Trucks cost only 8.6¢ per mile to run compared to 10.9¢ for our total truck fleet. This average covers all of our production, refining, marketing, pipeline and administration trucks. Since these figures include all maintenance and repair work, durability and reliability are two big factors that contribute to lower operating expense.

"Ford Trucks lead the fleet in these respects, too. A good case in point is our 1956 Ford F-800 winch truck. Its odometer reads just over 24,000 miles *but the engine has run an average of 7 hours a day, 5 days a week for the last 6 years.* Actually there are well over 8,000 hours on the engine so far, and without a major overhaul . . . this is service that we feel is the equivalent of 300,000 hard miles.

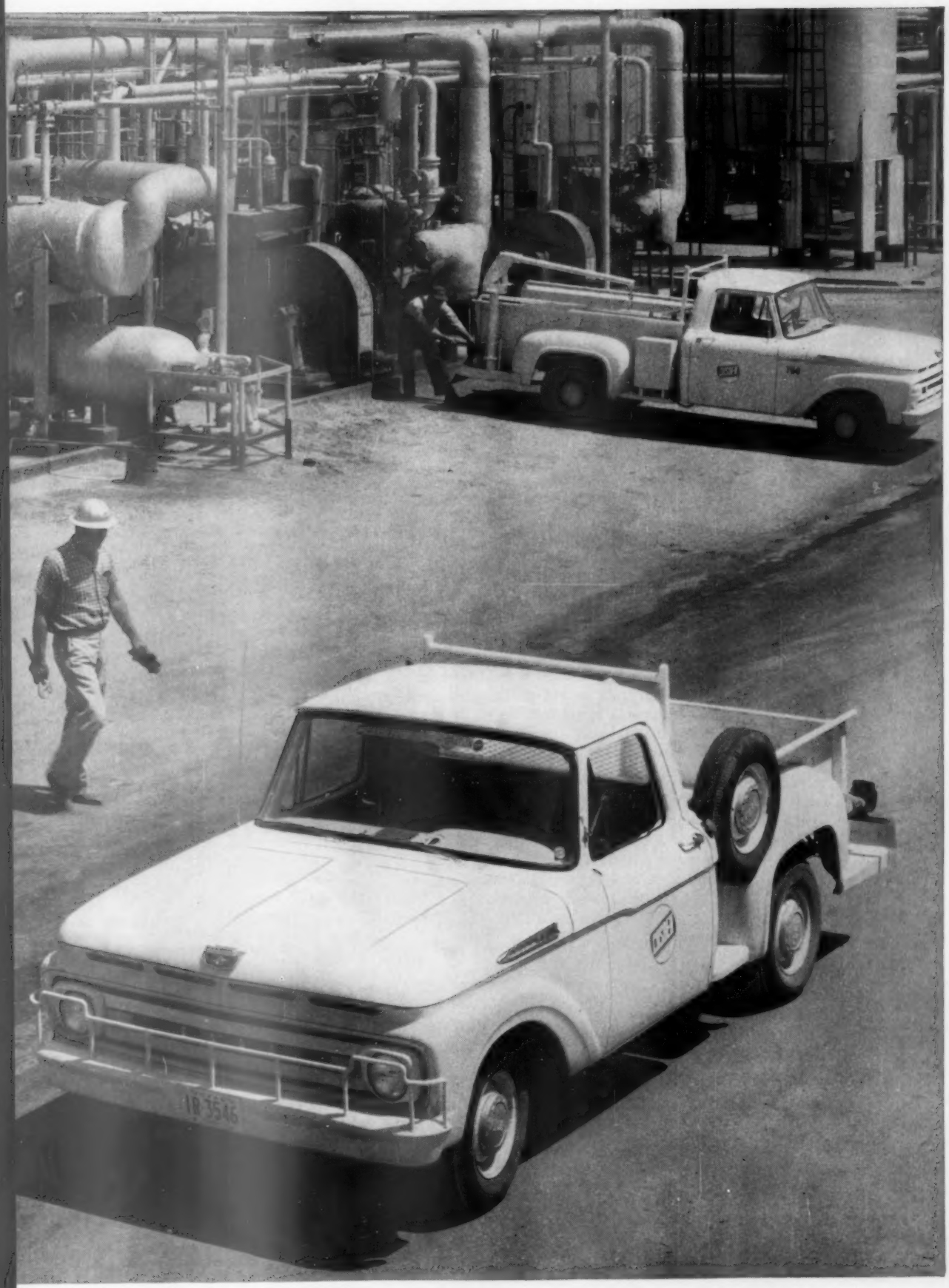
"Also, successive cost analyses have shown that we save money on maintenance and repairs by having all this work done at local Ford Dealer's. This system does away with our need for carrying an expensive parts inventory and reduces our own shop facility and manpower needs. Naturally, our 750 retail outlets do all the routine lubrication, washing and fueling for the fleet."

**Solid testimony that Ford's full-time economy only starts with low price!**

## FORD TRUCKS COST LESS




PRODUCTS OF Ford MOTOR COMPANY



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Product Ball Brothers' Pressure Sentry MK-7, for pumping, flowing, or shut-in wells, is permanently installed below the pump. Digital signals from a Bourdon tube-coded wheel assembly are sent up a single conductor wire to assure a ± 1% pressure readout accuracy. Readout is not influenced by absolute value of current or resistance of wire. A simple, portable surface unit makes a permanent record of reservoir pressures on chart paper.

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Service Simple to install and operate. However, engineering, installation and repair services are always available from Ball Brothers.

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Department 104
BOULDER INDUSTRIAL PARK — BOULDER, COLORADO
*A Subsidiary of Ball Brothers Company, Inc.*

tion, transmission conference, Rice Hotel, Houston.

30-May 2 API, Division of Transportation, annual tanker conference, Del Monte Lodge, Pebble Beach, Calif.

MAY

2-4 API, Division of Finance and Accounting, midyear meeting, Americana Hotel, Bal Harbor, Fla.

4 Chemical Institute of Canada, rubber chemistry division, Niagara Falls, Ont.

7-8 Society of Petroleum Engineers of AIME, North Texas section, fifth biennial secondary recovery symposium, Wichita Falls, Tex.

7-8 American Society of Mechanical Engineers, maintenance and plant engineering conference, Royal Orleans Hotel, New Orleans.

10-11 API, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles.

11 Natural Gas Processors Association, Permian Basin regional meeting, Lincoln Hotel, Odessa, Tex.

11-12 Kansas Independent Oil and Gas Association, annual meeting, Broadview Hotel, Wichita.

14-17 API, Division of Refining, midyear meeting, Fairmont and Mark Hopkins Hotels, San Francisco.

16-18 API, Division of Production, eastern district meeting, Deshler Hilton Hotel, Columbus, Ohio.

17-18 Society of Petroleum Engineers of AIME, production automation meeting, Hobbs, N. M.

20-23 American Institute of Chemical Engineers, national meeting, Lord Baltimore Hotel, Baltimore.

22-23 National Petroleum Refiners Association, computer conference, Hotel Tulsa, Tulsa.

22-25 API, Division of Marketing, midyear meeting, Queen Elizabeth Hotel, Montreal.

23-25 API, Division of Transportation, annual pipeline conference, Denver Hilton Hotel, Denver.

23-25 Eleventh National Telemetering Conference, Sheraton-Park Hotel, Washington.

24-25 AIME, Rocky Mountain petroleum sections, annual joint meeting, Billings, Mont.

27-30 Chemical Institute of Canada, Canadian chemical conference and exhibition, Macdonald Hotel, Edmonton.

JUNE

4-6 American Society of Mechanical Engineers, lubrication symposium, Deauville Hotel, Miami Beach.

10-15 American Society of Mechanical Engineers, summer annual meeting, Hotel Frontenac, Quebec.

13-14 National Petroleum Refiners Association, Mid-Continent regional meeting, Lassen Hotel, Wichita.

20-23 Canadian Gas Association, annual meeting, Manoir Richelieu, Murray Bay, Que.

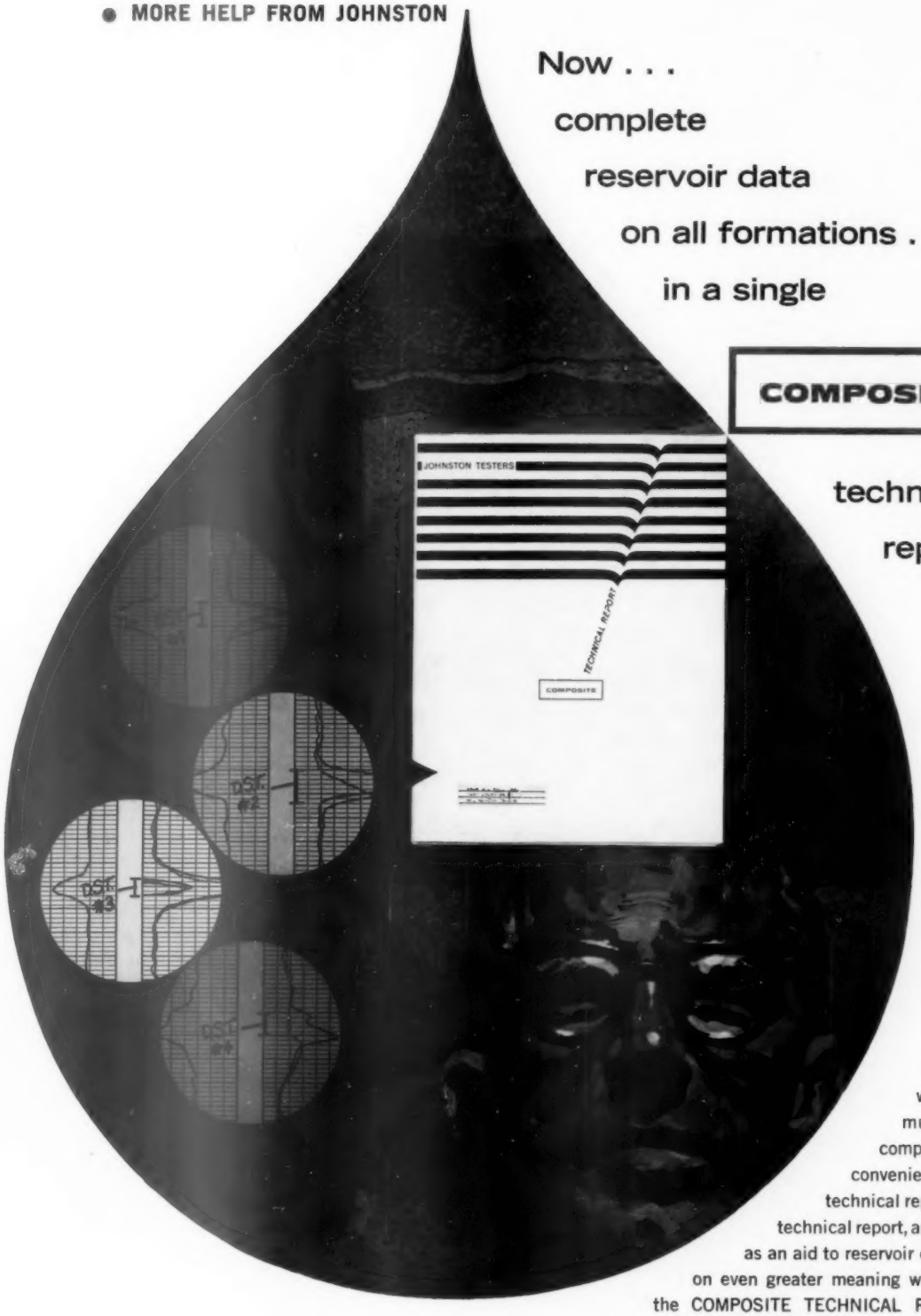
24-29 American Society for Testing Materials, annual meeting and exhibit, Hotel Statler, New York.

25-26 Michigan Gas Association, annual meeting, Grand Hotel, Mackinac Island, Mich.

27-29 Automatic Control Conference, sponsored by Instrument Society of America, American Institute of Chemical Engineers, American Institute of Electrical Engineers, American Society of Mechanical Engineers, and Institute of Radio Engineers, New York University, New York.

● MORE HELP FROM JOHNSTON

# Now . . . complete reservoir data on all formations . . . in a single COMPOSITE technical report!




Now, data from wells requiring multiple tests are compiled in a single convenient, comprehensive technical report. The Johnston technical report, announced recently as an aid to reservoir engineering, takes on even greater meaning with the advent of the COMPOSITE TECHNICAL REPORT. Look to Johnston . . . the originator of testing . . . for continued improvements in reservoir data gathering.

A WORLD OF EXPERIENCE

FORMATION AND CASING TESTING — JOHNSTON

## JOHNSTON TESTERS

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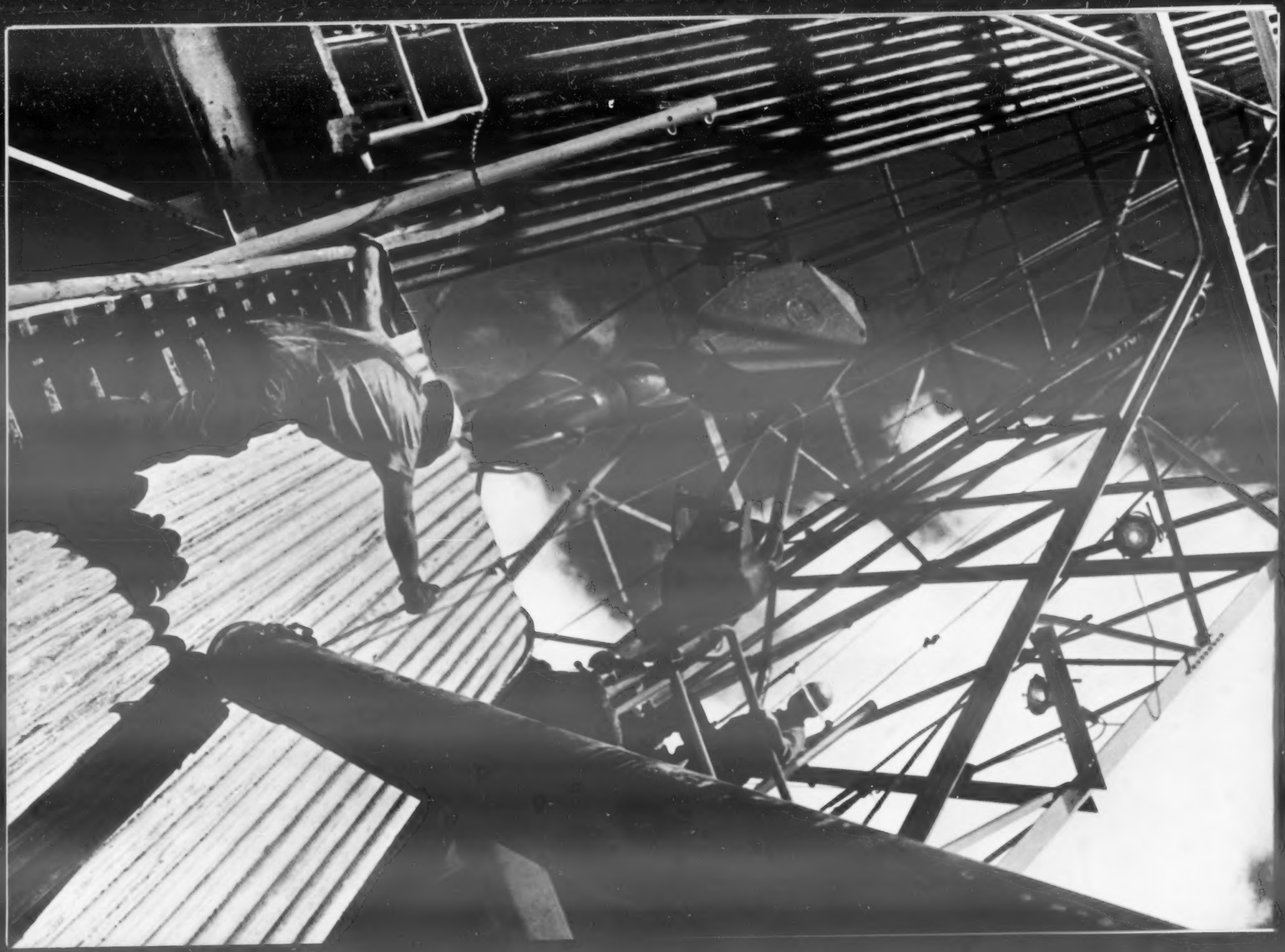
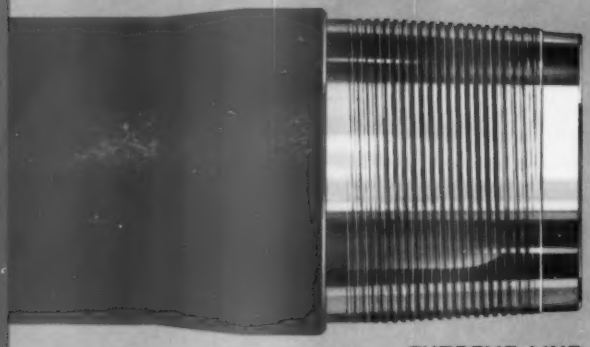
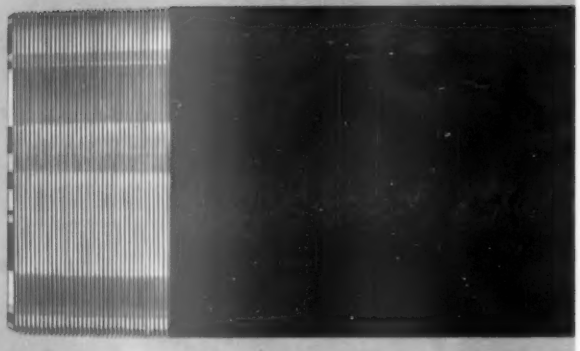


BUTTRESS



EXTREME LINE



API T&C

# CASING

## Run quality Seamless with the Orange Band brand

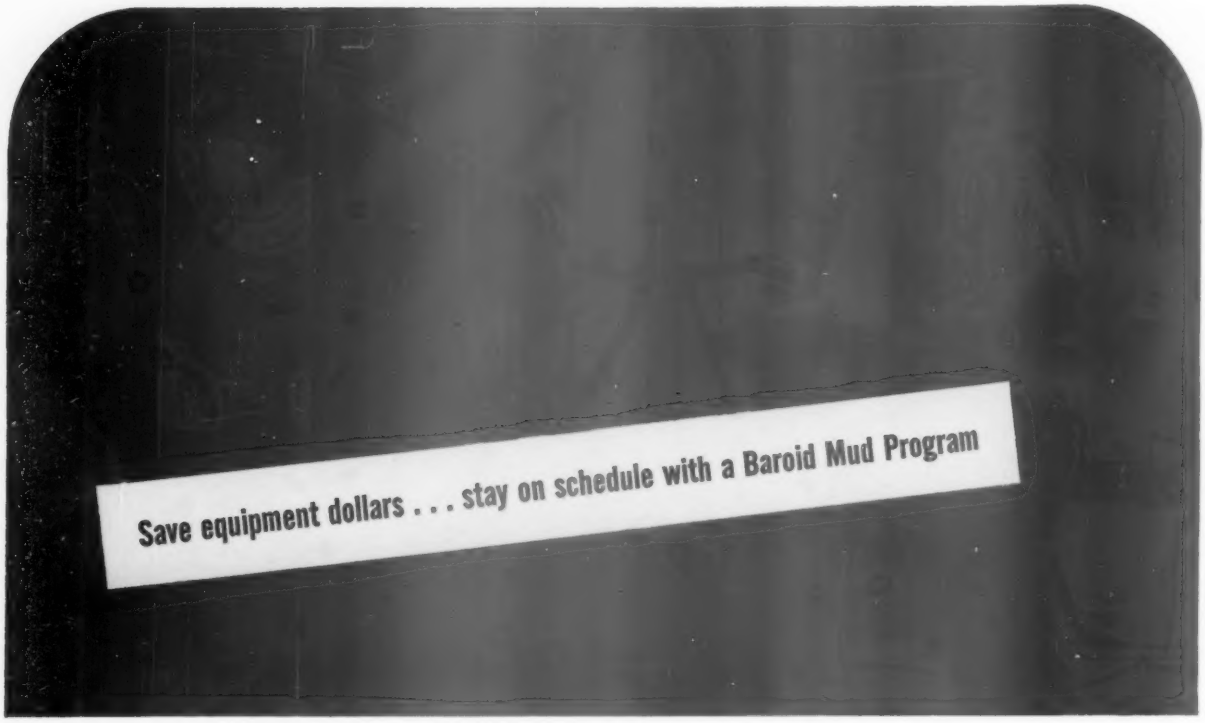
Drill deep. Design your string. Match grade and weight with Orange Band casing from Youngstown. Get the quality and strength you need in every length for every depth, to meet tension, collapse and bursting loads. Quality Orange Band casing from Youngstown, makers of the world's most complete line of Oil Country Tubular Goods.

Get Youngstown seamless casing in all weights from 4½" through 13⅜" O.D. API (long or short) T&C in H-40, J-55, N-80, and P-110. Or specify Youngstown's Buttress T&C, Extreme Line and Speedtite integral joints in J-55, N-80 and P-110.

Youngstown casing is Youngstown-made from original ore to final, inspected pipe. Call on Youngstown for 24 hour service from intransit stocks . . . plus casing design service from Youngstown's field engineering staff, largest in the industry. Next string you run, depend on high quality Youngstown Seamless Orange Band casing.

## Youngstown – growing force in steel

For details on all grades, weights of Youngstown Casing, write: Dept. 2D,
**The Youngstown Sheet and Tube Company, Youngstown, Ohio.**




Baroid Field Report: Cass County, Texas

# X-COR* solves drill pipe corrosion problem

Baroid's new film-forming corrosion inhibitor X-COR was proved again by successfully controlling drill-stem corrosion caused by hydrogen sulfide gas from the Smackover Lime formation in Cass County, Texas.

The Smackover Lime is an oil productive zone, but its corrosive sulfides severely attack drill pipe. In Cass County, pilot tests warned when the Smackover Lime formation was being entered at 11,000 feet. A slug treatment of only 2 lb/bbl X-COR was added through the pump suction and drilling proceeded to total depth of 11,200'. The flow properties of the drilling fluid remained unchanged, and the drill pipe came out of the hole free from attack by corrosion.

X-COR produces a tenacious waterproof film that protects down-hole equipment and seals the hole wall and cuttings against hydration, especially important in drilling shale formations. X-COR also serves effectively in packer fluids to ward off corrosion by fluids left in the casing/tubing annulus. X-COR inhibits corrosion caused by hydrogen sulfide gas, oxidation and electrolytes. Easy and safe to use, X-COR does not fluoresce, does not significantly change mud properties and is compatible with all commonly used water-base mud systems.

X-COR demonstrates again that Baroid's new customer-oriented program of research and marketing saves you money. For full details on X-COR, write for free data sheet.

*TRADEMARK, BAROID DIVISION NATIONAL LEAD COMPANY

BAROID

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BAROID—*Still Pioneering Drilling Mud Research • Engineering • Marketing*

6131

# THE JOURNAL SAID

## 50 years ago

November 9, 1911

Power lines of the Beaumont Ice, Light & Refrigerating Co. have been extended to Spindletop oil field, southeast of Beaumont, Tex., where the use of electric power for pumping oil wells will be tried out for the first time. The first motor installation, in operation only a few days, seems to be giving satisfaction.

Opinion in scientific circles is growing that large deposits of petroleum ultimately will be discovered and exploited in countries surrounding the Mediterranean Sea. Numerous springs of petroleum are reported to have been found in Tertiary formations in Turkey, especially in that part located in Asia Minor. The valleys of the Tigris and Euphrates rivers also are believed to be particularly rich in oil. Algeria already has produced some oil, and southern Spain is being surveyed.

## 25 years ago

November 5, 1936

Sunray Oil Co. and Phillips Petroleum Co. complete their 11 State, a directionally drilled well which taps the prolific Wilcox-sand production of Oklahoma City field at a location directly under the capitol at a depth of 6,465 ft. Surface location is 220 ft. west, across the street from the building. The well flowed 190 bbl. per hour with tools still in the hole.

Record high pressures ranging up to 5,000 psi. are controlled by Stanolind Oil & Gas Co. (Pan American) in completion of its Candelari wildcat on the Greens Bayou prospect, northeast of Houston. Well is saved after blowout at 7,499 ft. Continental Oil Co. recovers record string of pipe in world's deepest fishing job at total depth of 11,732 ft. in its 1 O'Hebert wildcat on the Abbeville prospect in Vermilion Parish, coastal Louisiana.

## 10 years ago

November 8, 1951

National Iranian Oil Co. resumes part operation of huge Abadan refinery, shut down since July after being nationalized and taken over from Anglo-Iranian Oil Co., Ltd., with expulsion of British.

Nederlandse Aardaolie, Mij., jointly owned by Ataafsche Petroleum, Mij., and Standard Oil Co. (N. J.), report the discovery of gas in commercial quantities near Tubbergen, in Overijssel Province, Netherlands. The discovery is on an anticline stretching eastward from Ommen into Germany. Productive area is expected to cover 18,000 hectares.

# JOURNALLY SPEAKING

## Innocent abroad

WHEN the National Press Club's charter flight returned from Europe, a sign across the bar warned: "Don't tell us about your trip, tell it to the National Geographic."

But the Geographic hasn't asked us, so we bore every captive audience we can corral.

Travel is broadening, they say, and we sure got broadened. Hardly anything was the way we had pictured it.

The plumbing wasn't as bad as had been described, but the coffee was definitely worse.

The Alps weren't as overwhelming as we had anticipated (perhaps because we've seen the Canadian Rockies), the Black Forest wasn't very black, and the Monte Carlo casino wouldn't hold a candle to any one of a dozen motels in Las Vegas. But London looked just exactly as it ought to.

We can't say precisely what we expected to find in other places, but what we did find was different.

The British looked extraordinarily like Englishmen, but the Swiss looked like Germans, the Italians looked like French, the Dutch looked like Americans, and the Americans looked like tourists.

We didn't get Swiss steak in Switzerland, Bologna sausage in Bologna, Brussels sprouts in Brussels, or lyonnaise potatoes in Lyons, but we did get lots of spaghetti in Italy.

We drank ale in England, beer in Germany, schnapps in Holland, wine in Italy, and brandy in France, but mostly we drank Coca Cola.

We rode a double-decker in London, a steamer on the Rhine, a funicular in Switzerland, a gondola in Venice, a train in Italy, and rubber-neck buses everywhere.

Saw uncounted numbers of: Roman ruins, Gothic cathedrals, medieval castles, historic sites, renowned paintings, monuments to people we never heard of, statutes of Aphrodite in half a nightie, and new buildings under construction everywhere.

Saw practically no: poverty, shower baths, poor roads, anti-Americanism, drinking fountains, traffic accidents, bargains, unkempt yards or buildings, really good-looking girls in Paris.

Biggest surprise: the universal look of prosperity, orderliness, and busy-ness. Every place looked neat and tidy, and Holland looked cleaner than clean.

Minor surprises: the tremendous number of new apartment houses surrounding every city; the huge volume of river and canal traffic; the scarcity of intercity truck transport; the hordes of bicycles and motor scooters; the number of vacationing Europeans; the ease of getting around in strange places.

Biggest thrill: the Roman Forum, which was the origin of our system of law and government administration—particularly the slab where lay the body of the slain Caesar whose book on the Gallic Wars nearly slew us in second-year Latin.

Biggest puzzlement: why does everything in Europe look so photogenic? Even barns, haystacks, doorways, and back alleys cry out to be photographed or painted. Are things really more picturesque over there? Or just different?

Resolutions for next trip: bone up on history, geography, and art; take more time, camera film, easy shoes, money.

General impression: all Europe is prosperous, confident, building. Maybe it's being done with our money, but everything seems very much on the up and up.

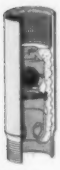
The oil business in Europe? Don't ask us. This was strictly a vacation trip, and we never gave oil a thought.

P.S.—Would you like to drop around and see a few hundred of our slides some evening?

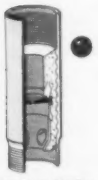
*—Henry D. Ralph.*

## COLLARS

Differential Fill-Up Collar
Product No. 1091 M&F



Flexiflow Fill-Up Collar
Product No. 161 M&F



Circulating Flexiflow Fill-Up Collar
Product No. 161-D M&F

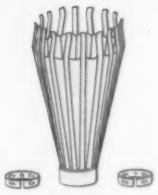
Cement Float Collar
Product No. 101 M&F

Cement Baffle Collar, with Hole
Product No. 104 M&F

Insert Valves, Float-Check Type
Product No. 176 and Flexifill Type
Product No. 177

Triplex Flapper Valve Float Collar
Product No. 134 M&F

## BASKETS

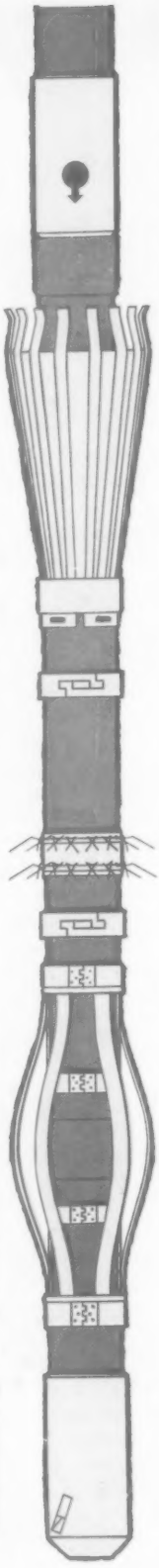


Metal Petal Basket, with Stop Rings
Product No. 343

Plain Hook-Up Nipple with Metal Petal Basket
Product No. 330

Avoid welding . . . lock casing shoes and collars with BAKERLOK Thread-Locking Compound Product 050

**It makes good sense to buy the best primary cementing equipment** *at your supply store!*



## SCRATCHERS

Hinge-Lok Wall Scratcher, with 4½" long wires
Product No. 900-C

Hinge-Lok Wall Scratcher, with 2½" long wires
Product No. 900-C

Solid-Ring Wall Scratcher, with 4½" long wires
Product No. 901-C

Solid-Ring Wall Scratcher, with 2½" long wires
Product No. 901-C

Hammer-Lok Stop Rings
Product Nos. 940-B (Solid) and 945-B (Hinged)

Rotating Wall Scratcher
Product No. 903

## CENTRALIZERS

"G-12" Slim Hole Casing Centralizer
Product No. 910-G

"HN-15" Solid-Ring Casing Centralizer
Product No. 908-HN

"HN-20" Solid-Ring Casing Centralizer
Product No. 908-HN

"H-15" Hinge-Lok Casing Centralizer
Product No. 9115

"H-20" Hinge-Lok Casing Centralizer
Product No. 9112

"H-25" Hinge-Lok Casing Centralizer
Product No. 9113

Hinge-Lok Rigid Casing Centralizer
Product No. 9133

## SHOES

Differential Fill-Up Shoe
Product No. 1081

Flexiflow Fill-Up Shoe
Product No. 160

Cement Float Shoe
Product No. 100

Cement Wash-Down Whirler Float Shoe
Product No. 120

Cement Bull Plug Shoe
Product No. 103

Cement Guide Shoe
Product No. 102

Triplex Cementing Shoe
Product No. 1363

BAKER

# BAKER

**BAKER OIL TOOLS, INC.** HOUSTON | LOS ANGELES | NEW YORK

# Two dozen men could lift oil from chaos

FOR MANY MONTHS the domestic oil industry has been struggling with the problem of declining profits caused by an excess of products and ruthless price cutting.

Efforts have been made to attribute the basic cause of the problem to various factors—imports, independents, slack demand, weather.

In discussing this last March 6 the Journal said: "We suspect the root of the trouble is poor management by the heads of a couple of dozen big refining companies. The industry looks to them for leadership, and what does it get? More surplus stocks of oil."

OUR SUSPICION HAS STRENGTHENED in the intervening months. We are quite convinced that management—or mismanagement—of a score of major companies has created the problem.

Independent refiners and marketers may have shortcomings, but all of them put together couldn't have created all the chaos that exists in the industry. They just don't have enough volume or swing enough weight.

We are even more convinced that, whatever the basic causes, the cure can come only from a change in attitude at the tops of the big companies.

It is the majors who can bring down the national levels of refinery runs and surplus stocks. It is the majors who can draw the line at pointless price cutting. It is the majors who set the examples and give the cues that the industry follows.

And it is the majors who have the most to lose if the industry slips into a bottomless pit—or, perchance, if Uncle Sam calls the game on account of unnecessary roughness.

These majors don't need to agree to control output and boost prices. All that is required is that each feel some social responsibility, stop doing things that are bad for the industry as a whole, and follow a civilized live-and-let-live philosophy instead of a dog-eat-dog rule of the jungle.

WHEN EACH TOP EXECUTIVE runs his company as though it were the only one in the industry, that is anarchy. When two companies determine to run each other out of business, that is a suicide pact.

And when a score of majors simultaneously are setting examples of irresponsible market glutting, unconscionable customer raiding, and self-oriented expansion policies, they are inviting all the rest down the road to anarchy and drawing a blueprint for industry suicide.

Today the oil industry is in chaos bordering on crisis. It could move forward to firmer ground if the top executives of the major companies would bend their policies toward survival of their industry rather than aggrandizement of their own companies only.

# Dowell Acidizing

*– lowest cost way to stimulate many oil and gas wells.*

**Pioneer in the field of acidizing, Dowell has constantly improved both the engineering of acid treatments, as well as the products and services themselves. Here are some of the important field proved acidizing services offered by Dowell to help you get the best possible results.**

**RETARDED ACIDS** — slow-acting acids designed to penetrate deeply before spending. They are used to improve production from fast-reacting, vugular, oolitic, or naturally fractured formations.

**MUD ACID** — a special acid solution that dissolves and disperses mud on screens, liners, perforations and the pay. It also increases permeability of certain sand formations which have low solubility in regular acid.

**BDA* BREAKDOWN ACID** is designed to penetrate and disperse mud cakes by reducing surface tension, by preventing and breaking emulsions and by removing water blocks. It is often used to break down formations ahead of fracturing, cementing and conventional acidizing treatments.

**SILICATE CONTROL ACID** has special agents added to prevent the swelling of clay minerals and other formation silicates. It also prevents or breaks certain emulsions.

**STABILIZED ACID** contains an additive to prevent the formation of formation-plugging iron hydroxide precipitate. Many troublesome water injection wells have been successfully treated with Stabilized Acid.

**ADDITION AGENTS** are available to reduce surface tension, prevent or break emulsions, remove or prevent the formation of compounds that might plug the formation, and speed up or slow down acid reaction with the formation.

Acids may be tailored to the requirements of a specific well by the use of one or more Dowell addition agents.

**MANY AUXILIARY DOWELL SERVICES** are available to help make acidizing treatments more effective. These services include Abrasijet* abrasive jetting service and a number of diverting agents for selective or multiple zone acidizing.

**SEVERAL FRACTURING SERVICES** that employ acid-base fracturing fluids are offered by Dowell. Often, wells fractured with acid-base fluids give higher production or flatter decline curves than could be expected from either acidizing or fracturing alone.

**THE ACID GUIDE*** — Dowell's method for planning and predicting the results of acidizing treatments — helps operators get the most profitable treatments for their wells.

For greatest profits, check on Dowell field-proved acidizing for every well you plan to treat. Ask your Dowell representative for full information. Dowell services and products are offered in North and South America, Europe, North Africa and Iran. Dowell, Tulsa 14, Oklahoma. *DOWELL SERVICE MARK

SERVICES FOR THE OIL & GAS INDUSTRY

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

# Third quarter shows earnings letdown

| | 9 Months ($1,000) | | Third Quarter ($1,000) | | Refinery Runs (bbl. daily) | | Production (bbl. daily) | |
|---|---|---|---|---|---|---|---|---|
| | 1961 | % change | 1961 | % change | 1961 | % change | 1961 | % change |
| Jersey | 570,000 | 13.8 | 135,000 | −0.7 | 3,082,000 | 7.9 | 2,715,000 | 8.4 |
| Texaco | 309,239 | 10.8 | 110,513 | 8.7 | 1,395,000 | 6.2 | 1,446,000 | 11.1 |
| Gulf | 248,900 | 4.6 | 79,200 | −3.2 | 852,020 | 14.5 | 1,483,197 | 0.1 |
| California Standard | 205,207 | 3.0 | 68,725 | −2.7 | 553,700 | 6.2 | 471,600 | 9.6 |
| Socony Mobil | 161,600 | 18.9 | 52,800 | 0.6 | 584,000 | ... | 272,000 | ... |
| Indiana Standard | 112,025 | 8.9 | 37,847 | −0.2 | 649,000 | ... | 347,000 | 10.0 |
| Shell | 103,014 | −1.2 | 33,331 | −4.8 | 540,000 | 7.1 | 321,000 | 0.6 |
| Phillips | 80,427 | 1.9 | 25,525 | −6.1 | 237,000 | 1.8 | 284,000 | 1.4 |
| Continental | 42,713 | −7.8 | 13,991 | −19.4 | 203,301 | 0.6 | 197,091 | −0.9 |
| Sun | 38,220 | 9.7 | 14,173 | −4.4 | 220,908 | −4.6 | 159,410 | 6.5 |
| Atlantic Refining | 31,699 | 15.7 | 10,050 | −4.2 | 194,600 | 1.8 | 156,900 | 3.2 |
| Cities Service | 30,752 | 15.9 | 6,833 | −13.1 | 257,171 | 0.3 | ... | ... |
| Sunray | 30,132 | 3.6 | 8,216 | −20.5 | 150,915 | 3.4 | 88,644 | 11.2 |
| Ohio Oil | 27,609 | 0.7 | 8,309 | −14.1 | 93,945 | −6.3 | 118,208 | 8.8 |
| Union Oil | 27,300 | 15.2 | 10,600 | 1.9 | 161,000 | ... | 95,000 | ... |
| Sinclair | 26,550 | −23.1 | 3,388 | −73.6 | 394,766 | −5.8 | 187,725 | 3.5 |
| Tidewater | 21,930 | −30.1 | 7,212 | −44.8 | 253,000 | −0.4 | 124,000 | 9.7 |
| Ohio Standard | 17,960 | 2.2 | 6,311 | −4.6 | 140,386 | 1.0 | 37,914 | −3.1 |
| Skelly | 17,071 | −0.3 | 5,258 | −13.2 | 51,451 | 2.3 | 64,000 | 1.7 |
| Texas Pac. Coal & Oil | 4,926 | −14.5 | 1,403 | −21.7 | ... | ... | ... | ... |
| Colorado Oil & Gas | 3,146 | 393.1 | 934 | −1.9 | 19,332 | −7.3 | 10,278 | 50.3 |
| Apco | 2,493 | 24.7 | 750 | −31.7 | 30,279 | −0.2 | ... | ... |

# Pickup needed to hold '61 profit line

**Nine-month earnings are ahead of 1960 figures for same period, but this year's total profits may lag if fourth quarter is as sad as the third.**

THE integrated oil companies had a disappointing third quarter, and conditions must improve fast for the fourth to be much better.

Enough third-quarter earnings reports are out now to give this economic picture: The July-September income of the majors fell off from last year, but profits for the year so far are running ahead of 1960.

There are only three exceptions to the third-quarter decline. Texaco, Socony Mobil, and Union Oil of California show increases for the 3-month period.

Six other firms report earnings in the first 9 months of 1961 are lagging 1960 performance. They are Shell, Continental, Skelly, Tidewater, Sinclair and Texas Pacific Coal & Oil.

All the rest fit the pattern of declining profits in the third quarter but with the 9-month earnings up.

**Explanation.** The reason why profits stumbled in the third quarter is not difficult to find: Declining gasoline prices, high refinery runs, and more downward adjustments in crude-oil prices.

These same factors have persisted through the first month of the fourth quarter, and unless corrections are accomplished quickly they will spoil the profits performance for the year.

A change for the better may be in the making, however. Gasoline prices in the Mid-Continent have increased slightly in the past few days from their 10-year low. Indications favor further rise from a tightening market.

Sinclair President E. L. Steiniger echoes this optimistic note when he observes: "Conditions in the domestic oil industry have improved slightly, and there is no valid reason why the present unrealistic, low prices should continue to prevail. With seasonable weather in the fourth quarter, a more normal level of earnings may well be experienced."

Practically every company executive complains that low product prices—particularly gasoline—have played havoc with earnings. Some have seen profits decline despite near-record volumes of products sales. Others have managed to make up from crude production or other sources the money lost since midsummer on marketing. What also makes the third-quarter comparison rough this year is the memory of the upward trend of prices that was being enjoyed last year in the same

period. It tends to accentuate this year's downward trend.

One independent executive, Roland Rodman, president of Apco Oil Corp., openly blames "irresponsibility of management of some major companies" for the present marketing predicament.

He says his company's lower third-quarter earnings were due to industry conditions stemming from "excessive crude runs, destructive competition, and uncalled-for price wars due primarily to a mania for growth and the irresponsibility of management—principally on the part of the larger companies—seeking to expand markets at a rate much faster than the normal increase in market demand."

**The winners.** Of the three companies running against the third-quarter tide, Texaco shows the most remarkable gains.

Texaco had the best third quarter in its history with income from operations for the 3 months up 21.9% over the same period in 1960. The result was a jump in net income for the quarter from $101.6 million to $110.5 million.

Socony Mobil recorded a slight third-quarter gain—from $52.5 million last year to $52.8 million this year. Earnings for the 9 months, however, are running about 19% higher than a year ago, with crude production and refinery runs both up 5% over 1960.

Union Oil reports earnings of $10.6 million for the quarter compared with $10.4 million last year. Colorado Oil & Gas reported record per-share earnings for the quarter despite a slight drop in net income from 1960. Earnings for the 9 months are running 392% ahead of last year.

**Rough sledding.** Sinclair and Tidewater apparently had the toughest third quarter in the industry.

Sinclair's earnings declined from $12.8 million for the quarter last year to $3.3 million this year. Earnings for the 9 months now total $26.5 million against $34.5 million last year. For the first half this year, however, Sinclair's profits were 7% ahead of 1960.

The third-quarter trouble for Sinclair is explained quickly by a 6-week strike at four company refineries and depressed product prices. Although declines were experienced in crude runs and total sales volume, Sinclair showed notable improvements in production of crude, natural-gas, and petrochemicals.

Tidewater's third-quarter earnings totaled $7.2 million compared with $13 million last year, and the 9-months' profits are $21.9 million compared with $31.3 million a year ago.

Tidewater President George Getty attributes the declines to depressed marketing conditions in the industry. Tidewater's crude and natural-gas production and product sales all have been up this year.

Continental reports that special circumstances besides low product prices, explain its profits decline. The other factors are reduced crude production, higher intangible development costs and surrendered lease charges, increased wage costs, and higher interest costs.

**Sour note.** The real pinch is the present tendency of oil to run against the tide of the general economy.

Most other industries showed good gains in the third quarter; but petroleum, because of internal fighting, failed to profit by the general upswing.

# Allowable set for disputed Normanna gas well

A SPECIAL maximum allowable of 238,000 cu. ft. daily was set by the Texas Railroad Commission last week for Bright & Schiff's controversial 1 Joyce well in Normanna gas field in South Texas.

This is the volume which the Dallas independent sought for its 0.3-acre townlot gas well as the special allowable it should have if assigned 100 acres under an exception to the field's new 100%-average allocation formula.

The special allowable was backdated to take effect October 1. It would appear—under the order as written—that the 1 Joyce could not get an allowable in excess of 238,000 cu. ft. if field gas demand were to increase, but that it would get less if demand were to fall.

It is not yet clear whether opponents of Bright & Schiff in the bitter small-tract battle, which has raged back and forth in the courts and in the commission, will accept this special allowable without further action.

Attorneys for Atlantic Refining Co. and others contended at a commission hearing on the subject last month that a 100-acre allowable for the 1 Joyce would give it as much production as the defunct two-thirds acreage, one-third well Normanna formula. And this, they argued, would be acting contrary to the mandate of the Texas Supreme Court when it invalidated that formula (OGJ, Oct. 9, p. 61).

Indications at midweek were that major operators in Normanna, who opposed Bright & Schiff in the bitter small-tract battle in the commission and the courts, would not contest the special allowable further.

A spokesman for Atlantic told the Journal last week, "We do not plan to take further action. While we still feel strongly that this well is not entitled to any allowable giving it more than its fair share of Normanna production, we recognize the difficulties faced by the commission because of the well's having been drilled under the old allocation formula."

There was no comment from other large Normanna operators. But the best guess is that they too will go along with the commission decision.

Actually, the 238,000 cu. ft. allowable granted the 1 Joyce appears substantially less than a 100-acre Normanna well would get under the straight-acreage formula. The allowable for a normal 320-acre well is roughly 1,000 M.c.f., so 238,000 cu. ft. would figure out to be roughly the acreage allowable for a 76-acre tract.

This would not be greatly in excess of the 60 acres which Atlantic said should not be exceeded for the 1 Joyce if the commission felt the well must have a special allowable.

# Well-drilling cost still creeping up

THE COST of drilling a well is rising less rapidly than in the past, but it's still going up.

Since 1947 all costs other than the drilling, itself, have more than doubled, the IPAA cost-study committee last week reported to the association's annual meeting in Houston.

Actually, the prices of equipment and services have leveled off, the committee said, but the increasing depth of wells and more complete testing and treatment have greatly increased the volume of goods used and number of services performed. The result: A continued, steady increase in the total cost of punching a hole.

The committee study concentrated on 19 drilling-cost factors which, it said, represent more than 96% of direct operator costs. It left until a later report any consideration of the trend in rates paid the contractor.

## How well costs break down

(U. S. average)

| | % direct operator costs | % Total costs |
|---|---|---|
| **Rig costs** | | |
| Contract footage rate payment | | 27.0 |
| Contract day rate payment | | 12.0 |
| Total | | 39.0 |
| Road, site preparation | 6.4 | 3.9 |
| Transportation | 3.4 | 2.1 |
| Fuel | 1.0 | 0.6 |
| Water | 0.5 | 0.3 |
| Drilling mud | 11.5 | 7.0 |
| Cement, cementing service | 6.6 | 4.0 |
| Casing, tubing | 34.1 | 20.8 |
| Wellhead equipment | 3.1 | 1.9 |
| Well site logging | 1.8 | 1.1 |
| Other physical tests | 1.6 | 1.0 |
| Logs | 4.1 | 2.5 |
| Directional drilling service | 0.3 | 0.2 |
| Perforating | 2.5 | 1.5 |
| Formation treating | 5.6 | 3.4 |
| Tool rentals | 3.3 | 2.0 |
| Drill bits, reamers | 2.3 | 1.4 |
| Other equipment | 3.4 | 2.1 |
| Plugging | 0.8 | 0.5 |
| Supervision, overhead | 4.3 | 2.6 |
| Other expenditures | 3.4 | 2.1 |
| Total | 100.0 | 61.0 |
| Grand total | | *100.0 |

*Does not include turnkey contracts.

**Price trends.** Taking prices first, the committee said the composite of all 19 drilling-cost factors rose only 0.7% last year. Eight major items showed no increase at all over the previous year.

One—cement and cementing services—actually dropped by 0.2%, and 10 others increased by varying amounts. Biggest increase was in logs—up 3.4%.

The eight items which showed no increase during 1960 are drilling mud, well-site logging, all other physical tests, directional-drilling services, casing and tubing, drill bits and reamers, special-tool rentals, and miscellaneous cost items, including water.

Together, these eight items represent more than a third of the total cost of drilling a well. Casing and tubing, alone, total 20.8% of the average well's cost and are second only to the outlay to the contractor for the actual drilling (see table).

Items other than logging which showed some increase during 1960 include road and site preparation, up 2.2%; transportation, 2.7; fuel, 1.7; perforating, 1.1; formation treating, 3.2; well-head equipment, 1.8; other equipment and supplies, 0.1; supervision and overhaul, 0.7; and plugging, 2.4.

Over the past 14 years, however, the picture is different. Casing and tubing have more than doubled in price since the study was started in 1947. Next largest increases have been in supervision and overhead, up 92%, and fuel, up 85%.

**Total cost higher.** Although the combined price of all 19 items has increased only 59% since 1947, this doesn't tell the whole story.

Increasing depth of wells has required an increasing volume of drilling mud, casing and tubing, cement, and the other cost items. Too, said the committee, today's wells are logged more extensively, are treated more extensively, and in general require more services. The added volumes of materials and service, multiplied by a somewhat higher cost for each, has greatly increased the total cost of drilling.

Using a 1947-49 index of 100, the committee calculated that the total direct operator cost of drilling a well had risen to 215.1 in 1960.

The IPAA committee based its calculations on detailed well-cost reports from 42 producing companies which drill more than 8,000 wells a year.

Detailed costs were obtained on 880 of these wells, selected according to region, depth, and type of well so as to give a representative sampling of total U. S. drilling.

# FPC cuts proposed gas price in Louisiana

THE Federal Power Commission has cut 2 cents off the price it plans to allow natural gas producers in southern Louisiana.

The FPC proposes now to allow prices of 21.25 cents per thousand cubic feet, including state taxes, on new sales of gas. The tax is about 2.3 cents, but there are refund provisions. The old rate had been 21.5 cents, exclusive of taxes, and generally the FPC says it has been using 23.25 cents.

The FPC also set 19.5 cents for sales from the federal offshore areas, which are out of reach of the state tax. This is also a 2-cent reduction.

The FPC ruling was unanimous, and represents "the first downward adjustment" made in ceilings for any area since the area policy was started September 1960.

The commission explained that four U. S. Courts of Appeals have held the old level "out of line." Thus, the FPC said, it is "contrary to the public interest" to keep it.

# IPAA sees 2.8% gain in U. S. demand

**Supply-demand committee predicts national consumption will top 10,000,000 bbl. daily in 1962. The forecast also says the industry won't need an upsurge in crude output to meet this demand.**

OIL CONSUMPTION in the United States will top 10,000,000 bbl. daily next year for the first time.

But the U. S. crude-oil producer will benefit from the increase only if imports fall, or if stocks of crude and products are reduced from the current excessively high levels.

That's the conclusion of the supply-demand committee of the Independent Petroleum Association of America.

The committee, meeting last week in Houston, actually forecast an increase in domestic demand of 273,000 bbl. daily, a healthy 2.8% gain over 1961.

However, it saw enough offsetting factors to wind up with a prediction that the industry will need no increase in crude-oil production to meet this higher demand.

Here are the bearish factors IPAA sees for the crude-oil producer:

**Exports** will decline another 12,000 bbl. daily to only 165,000 bbl.

**Gas-liquids production** will rise 31,000 bbl. daily, all at the expense of crude.

**Changing yields** in U. S. refineries will necessitate a 70,000-bbl. increase in residual-fuel imports.

**Stocks of crude** and products will be cut 76,000 bbl. daily. But this year producers have sold 84,000 bbl. daily which went into storage. Since they won't be able to do this again in 1962, and assuming that stocks are actually reduced 76,000 bbl. daily, this will mean a 160,000-bbl. chunk out of the increase in demand.

All of these negative factors, added together, exactly match the expected increase in demand.

So, the IPAA committee concludes, the only chance that U. S. producers have for growth next year is through a cut in imports or for stocks to remain high. Interior Department has not yet released its imports program for 1962.

U. S. crude-oil production, the committee decided, probably will average 7,185,000 bbl. daily, unchanged from this year and only 2.1% above the level of 1960.

**Business outlook.** The committee's forecast for petroleum was modest by comparison with its prediction for business in general.

The committee sees a 7.7% jump next year in gross national product. The rise in business activity will continue throughout 1962, although the rate of increase "will moderate" during the last half, it said.

This year, it said, gross national product should total $520 billion, up 3.2% from 1960. But petroleum's performance, it added, has not been comparable.

The committee expects the industry to wind up 1961 with an average daily domestic demand of 9,797,000 bbl., up only 1.2% from last year. And a good portion of this is the 84,000 bbl. daily which has been added to storage and which will work against the nation's producers in 1962.

Refinery runs in 1962 are estimated by the committee at 8,234,000 bbl. daily, up 66,000 bbl. from this year's expected average.

Of the products, gasoline is expected to enjoy the largest increase in demand but even that will not be great. Gasoline demand is expected to average 4,300,000 bbl. daily next year, a 99,000 bbl. daily gain over anticipated demand this year.

# IPAA opposes bidding on wildcat federal lands,

THE IPAA offered last week to join with the Interior Department in a "constructive study" of the Mineral Leasing Act, but went on record firmly against changing the law to allow for competitive bidding on wildcat federal lands.

While recognizing that abuses have crept into the present drawing, or "lottery," method for leasing millions of acres of prospective western oil property, the IPAA's federal and public-lands committee was virtually unanimous in opposing the competitive-bidding method now used for offshore acreage and for known oil structures on land.

The sentiment expressed at the Houston meeting differed somewhat from the larger variety of views expressed in mid-October at the Rocky Mountain Oil & Gas Association meeting in Denver. At RMOGA some of the independents favored competitive bidding at public auction, though opposing sealed bids. Most favored keeping the 40-year-old, lottery-type system but tightening up on the rules to prevent abuses.

But the IPAA voted simply to oppose any federal legislation that would extend competitive bidding to additional federal lands. IPAA would also assist any study of the present law and regulations.

**How it started.** Discussion of competitive bidding was touched off September 26 at the New Mexico Landmen's Association at Roswell, where John M. Kelly, Interior Department assistant secretary, suggested that the department may sponsor competitive bidding legislation (OGJ, Oct. 2, p. 114). Kelly said many industry representatives and individuals are convinced that "a competitive leasing system in some form is the solution to the many public-land-leasing problems."

## IPAA's supply-demand forecasts for '62

(Thousands of barrels daily, except closing stocks)

| | 1961 | | | 1962 | | | | |
|---|---|---|---|---|---|---|---|---|
| | 3rd Q* | 4th Q | Year | 1st Q | 2nd Q | 3rd Q | 4th Q | Year |
| **Domestic demand** | | | | | | | | |
| Gasoline | 4,452 | 4,160 | 4,201 | 3,939 | 4,486 | 4,534 | 4,236 | 4,300 |
| Kerosine | 322 | 490 | 399 | 545 | 307 | 334 | 515 | 425 |
| Distillate | 1,322 | 2,220 | 1,915 | 2,733 | 1,485 | 1,297 | 2,275 | 1,945 |
| Residual | 1,244 | 1,600 | 1,486 | 1,893 | 1,368 | 1,262 | 1,642 | 1,540 |
| Other | 1,945 | 1,830 | 1,796 | 1,704 | 1,824 | 1,997 | 1,913 | 1,860 |
| Total | 9,285 | 10,300 | 9,797 | 10,814 | 9,470 | 9,424 | 10,581 | 10,070 |
| **Exports** | | | | | | | | |
| Gasoline | 23 | 27 | 25 | 22 | 25 | 24 | 22 | 23 |
| Kerosine | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 |
| Distillate | 13 | 19 | 17 | 17 | 19 | 17 | 15 | 17 |
| Residual | 38 | 37 | 40 | 37 | 38 | 32 | 33 | 35 |
| Other | 100 | 89 | 93 | 87 | 90 | 89 | 89 | 89 |
| Total | 175 | 173 | 177 | 164 | 173 | 163 | 160 | 165 |
| **Total demand** | 9,460 | 10,473 | 9,974 | 10,978 | 9,643 | 9,587 | 10,741 | 10,235 |
| **Stock change** | +415 | −436 | +84 | −633 | +275 | +488 | −445 | −76 |
| **New supply required** | 9,875 | 10,037 | 10,058 | 10,345 | 9,918 | 10,075 | 10,296 | 10,159 |
| **Closing stocks** (Million bbl.) | | | | | | | | |
| Gasoline | 184 | 193 | 193 | 219 | 191 | 177 | 185 | 185 |
| Kerosine | 36 | 31 | 31 | 23 | 30 | 36 | 31 | 31 |
| Distillate | 167 | 141 | 141 | 82 | 109 | 161 | 136 | 136 |
| Residual | 49 | 45 | 45 | 38 | 43 | 49 | 45 | 45 |
| Other products & Natural gas liquids | 165 | 153 | 153 | 151 | 165 | 160 | 150 | 150 |
| Crude oil | 254 | 252 | 252 | 245 | 245 | 245 | 240 | 240 |
| Total | 855 | 815 | 815 | 758 | 783 | 828 | 787 | 787 |
| **Runs to stills** | 8,277 | 8,139 | 8,168 | 8,272 | 8,042 | 8,285 | 8,329 | 8,234 |

*Estimate based on U. S. Bureau of Mines and API figures.

# offers aid on leasing study

The independents at Houston, however, feared that competitive bidding would destroy the chances for smaller operators to compete with major companies, and also would result in fewer wells.

Under the present system any individual who pays a small filing fee can ask for a lease. If he wins the drawing, he gets the lease. He pays an annual rental but does not have to drill to keep a 10-year lease active.

This system was defended as giving the smaller operator a chance to get some prospecting acreage and also encouraging more lands to be placed under lease. Presently there are 132,860 public land leases, covering 101.7 million acres. Of these, 5,800 leases — covering 3.45 million acres—are producible.

**Points of attack.** Advocates of competitive bidding contend that speculators and promoters dominate the drawings, and seldom does the person who gets a lease actually drill it himself. Instead, he sells it to others. The system also raises the suspicion that many companies have "dummies" who file for leases, thus increasing their chances.

Herbert Caplan, Interior official who attended the IPAA meeting, told the Public Lands Committee that no bill has yet been drawn for competitive bidding. But he said the department now has the entire Minerals Leasing Act under review, and that competitive bidding is only one of many subjects under study.

The committee, with IPAA approval, also reaffirmed its opposition to the so-called Wilderness Bill, which passed the Senate last session and is now in the House hopper. The bill would allow Interior to prohibit oil-and-gas operations on large sections of federal lands.

"We believe that the public domain can be used for recreational and wildlife purposes in harmony with oil-and-gas drilling operations," the committee said.

**Gas bill favored.** In another resolution passed by IPAA, the producers called again for a natural gas bill "to solve the problem of unworkable federal regulation."

Because of federal regulation of field sale of natural gas since 1954, "conditions within the industry are deteriorating," the resolution said.

The Federal Power Commission is making a "sincere effort" to solve the gas problem with area-pricing, the resolution added, but this approach is "fraught with uncertainties of legality and feasibility."

## Gasoline octanes rise slightly in October, Ethyl Corp. reports

BOTH regular and premium gasoline octanes increased during October, according to the monthly survey of antiknock quality by Ethyl Corp.

Regular weighted average rose to 92.9 Research octane number, 0.1 number above September and 0.4 above a year ago. Motor octane of 84.5 was 0.1 above September but unchanged from a year ago.

The premium average was 99.3 RON, 0.1 above September but unchanged from a year ago. The Motor octane was 84.5, unchanged from September and 0.1 below a year ago.

The regular advance was the third in 5 months after holding at 92.6 Research from November through May.

# Field price of California gas to increase soon

**New formula pegs California-produced gas to border price, but out-of-state gas still commands slight premium due to load factor on pipeline movements.**

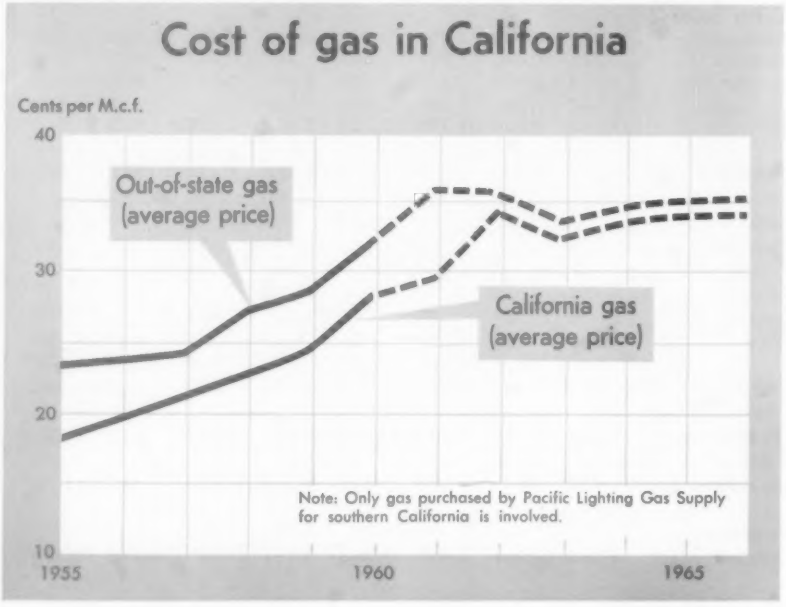
THE WELLHEAD price of gas in southern Califronia will go up 5.47 cents per thousand cubic feet the first of the year as the result of a formula which will give producers a price near that which out-of-state gas commands at the border.

Historically, California gas has been priced well below the big volume of out-of-state gas moved into the state.

Even under the new formula, which will affect about 200,000 M.c.f. daily purchased by Pacific Lighting Gas Supply Co., California gas will be priced slightly below out-of-state gas. PLGS's formula says California producers will receive the same price as the weighted average price of gas moving into the state.

However, the border price is pegged to a pipeline-load factor of 100%, not the 91% take-and-pay load factor at which the lines will operate. This lower operating rate runs up the price of out-of-state gas to 35.66 cents a thousand, or 1.19 cents higher than California gas.

But the new border-formula gives the producer a better price than in the past. Currently, southern California gas brings an average of 29 cents per thousand cubic feet compared with a border price of 35.9 cents.




**The future.** The 34.47 cents a thousand which will be paid to producers next year will be the peak for the next 5 years.

New supplies coming in under the Rock Springs agreement will drop prices the following year, then they will go up slightly below 34 cents the next 3 years as result of more gas from the Rock Springs line and from Transwestern pipeline (see chart).

The weighted average of all gas purchased in the state by Pacific Lighting is slightly below the border-formula price, since about 15% of the gas purchased is not covered by the company's new long-term contracts. The average for all purchases in 1962 will be 34.1 cents compared with the 34.47 cents paid to those producers covered under the border-price formula.

**Richfield missing.** One notable absentee among companies which have signed or plan to sign the PLGS contracts is Richfield Oil Corp.

Richfield and Pacific Lighting have been feuding since 1957, when the producer sold 500 billion cubic feet of gas to Southern California Edison Co. in a direct producer-consumer deal.

Pacific Lighting offered its new long-term contract—and the increased wellhead price—to other producers in hopes of averting any other cases of a producer dealing directly with a consumer.

In addition to being involved in the Richfield-Pacific Lighting fight, Edison also seeks its own gas supply by promoting a big-inch gas line from Texas through Mexico to California with Tennessee Gas Transmission Co. Months of hearings have been held on the Edison line, but no action taken.

In the past Pacific Lighting has been writing short-term contracts of 3 to 5 years for its gas supply.

In addition to the higher price, Pacific Lighting's new contracts also cover all gas produced by a company in its franchise area.

**State threat.** While the price increase is a break for California producers, they are still facing a serious threat from the state's Public Utilities Commission.

The commission will start a series of hearings in December to determine if the state should step in and control the wellhead price of gas. The producers are expected to oppose any such regulation on the grounds that it is unnecessary and that no other state regulates the field price of gas.

## Two new refineries planned by Texaco in overseas program

TEXACO Inc., plans two new refineries outside the United States and will expand a third.

A major plant of 80,000 to 100,000-bbl. daily capacity will be built in the United Kingdom. Ownership will be 50% by Texaco and 50%

by Caltex, a joint operation of Texaco and California Standard.

Site for the plant has not been selected, according to Texaco Chairman Augustus C. Long. Texaco earlier this summer abandoned plans for a refinery at Southampton because of local opposition.

Texaco also plans a 13,500-bbl. refinery in Halifax, Nova Scotia, provided necessary agreements can be reached with provincial authorities.

In Trinidad, a 2-700-bbl.-daily lube-oil plant will be built at the Pointe-a-Pierre refinery. Cost of the expansion has been estimated at $27.5 million. A $30-million expansion at the plant was completed last year; and still the plant reportedly is running 250,000 bbl. daily of crude, about 15,000 bbl. daily above rated capacity.

## More allocations for resid imports granted by OIA

THE Oil Import Administration has handed out more tickets for residual fuel oil imports, completing the allocations for the year that ends March 31.

OIA divided up another 2,500,000 bbl. among 48 importers to District 1, thus raising the total allocations to 461,427 bbl. daily, a target announced earlier this year.

More than half the new allocations—some 1,547,000 bbl.—went to the four largest residual oil importers, Standard Oil Co. (N. J.), Texaco Inc., Hess, Inc., and Metropolitan Petroleum Co.

The figures, considered final for the calendar year 1961, show the 10 largest residual importers with their volumes of imports are:

Gulf Oil Corp., 10,260 bbl. daily; Hess, Inc., 44,041; Metropolitan Petroleum Co., 34,339; New England Petroleum Corp., 9,642; Shell Oil Co., 24,533; C. H. Sprague & Son, 24,325; Standard Oil Co. (Ind.), 24,531; Standard Oil Co. (Ky.), 12,519; Standard Oil Co. (N. J.), 117,899; and Texaco Inc., 62,535.

The residual-fuel import program was placed on a yearly basis last April. However, there are quarterly restrictions on maximum imports.

# Welding "first" chalked up

**Contractor uses semiautomatic welding process on entire pipeline project. New device speeds work, cuts labor.**

SEMIAUTOMATIC welding of pipe along the right-of-way has been used on an entire pipeline project for the first time. The project is a 100-mile 6-in. gathering system installed by the Rocky Mountain Natural Gas Co. near Carbondale, Colo., on the western slope of the Rockies.

H. C. Price is the contractor on the job, which is just winding up. A device developed jointly by Price, Hobart Brothers Co. and Crose-Perrault Equipment Co. was used. The operation began as a field test of the welding unit, but the device worked so successfully that it was used throughout the project.

It is an adaptation of the Micro-Wire process originally developed for the welding of sheet metal. It uses a consumable wire electrode which is continuously fed into the arc. A light-weight torch on a 16-ft. cable directs the electrode wire and the $CO_2$ shielding gas into the welding zone. The wire is very thin, usually from 0.030 to 0.045 in. in dimeter.

Power is supplied by a gasoline-engine-driven, 300-ampere, modified CV welder. The welder is mounted on a pickup truck which can be driven along the right-of-way. Control box is visible at right in photo above.

The head welder on the Rocky Mountain project produced more than 215 joints per 8-hour day. This is equivalent to a stringer weld in slightly more than 2 minutes, including moving up and lining up. Actual arc time is about 1 minute. Use of the process speeded construction and reduced manpower.

The welding crew consisted of three welders. The head welder, with an assistant, lined up the joints with standard lineup clamps. The stringer or root pass was equivalent in thickness to both the stringer pass and hot pass made by manual electrode welding. No cleaning is needed after the stringer pass, a factor which contributes to the faster rate.

Two crews of two men each made the second and last pass for each joint. These welders alternated joints, since there was a larger volume of weld metal required in the second pass than in the first. They easily kept pace with the stringer head welder. The downhill technique was used in making both passes.

# Suppliers aren't coasting, but going's

**Like the rest of the industry, suppliers have been fighting hard to stay on course during the long period of excess capacity. Way is still bumpy, but diversification and other measures have helped cushion the shocks.**

**DIVERSIFICATION** program of Seismograph Service Corp. led to manufacture of this voting machine.

**CENTURY CORP.** has expanded its activities to include manufacture of aircraft seats like these.

AFTER 5 years of agonizing adjustment to conditions of excess producing and refining capacity, the oil industry may never again be the same.

Neither will the equipment-manufacturing and supply business, because the determined and successful drive for greater efficiency and profitability on the part of operating companies has had its natural corollary among their suppliers.

"Oil companies' efficiency programs," observes one struggling supplier, "have been exercises in belt tightening about neck high—using their belt and our neck."

Although the experience may have left him temporarily short of breath, this supplier is perhaps in a sounder business position for the long term. The same new technology which is responsible for much increased efficiency and which cost him business for a time has created still other new-product opportunities.

Both the operating and supply segments of the industry have reacted to drastically altered conditions with drastic measures which in many cases have paralleled each other. The main steps taken by suppliers will look familiar to oil companies:

**Diversification,** often through mergers, to broaden product lines within an industry division, to branch out into a new division, or to enter an entirely new business unrelated to oil to open new growth opportunities.

**Expansion overseas,** through new or more aggressive export sales or construction of foreign plants to compete for business which is not available to American manufacturers for one reason or another.

**Cutting payrolls.**

**Reducing services and stores** where they were found to be unnecessary or marginal.

**Diversification.** A large number of firms have broadened product lines or turned to the "complete package" approach to improve sales totals and cut the costs of marketing in the process.

A manufacturer of plant controls branches into the booming pipeline industry.

A maker of one component of a supervisory control system develops a complete package.

A gas-turbine manufacturer teams with a pump manufacturer to enhance the marketing strength of both.

A compressor manufacturer joins a manufacturer of aircraft-type gas turbines.

A controls manufacturer buys out a manufacturer of valves.

A drill-bit manufacturer enters the machine-tool business.

A maker of valves acquires manufacturers of controls and computers, piping fabrication, pumps, panel boards, and integrates the group into a package flow-control system.

The great supply firms of almost industry-wide scope enter new divisions of the industry for insurance against the ups and downs of a single branch.

The examples are endless, and all have the same motive—to widen avenues of profit possibilities.

Schlumberger Well Surveying Corp. has branched into data-transmission equipment. Halliburton Co. has broadened its oil-well-servicing repertoire.

Two manufacturers of drill bits and tool joints, serving the industry division which has been hit hardest by the drilling slowdown, diversified into other industries only last month.

Reed Roller Bit Co. acquired two California companies, makers of precision torque hand and power tools. Hughes Tool Co. is offering a machine-tool rebuilding service. Hughes has also branched out into drilling blast holes for mining, sinking large-diameter shafts for underground silos for missiles, and drilling holes for bridge and building piling.

Manufacturers of geophysical

# easier now

equipment—Century Geophysical Corp. and Seismograph Service Corp., to name but two—are producing such exotic items as aircraft seats, missile control systems, and voting machines.

**Package approach.** One of the more conspicuous examples of this trend is Crane Co., which in the last 2 years has spent more than $40 million in acquisitions in the U. S. in the flow-control field.

Why this approach?

"Survival," explains Dante C. Fabiani, president of Crane, which is in position to furnish both the hardware and the design for flow-control systems. "Today you have a shot at business you couldn't touch without a package to offer. In 10 years you won't be able to sell a customer a single flow-control component alone. You will have to be able to offer him a complete package, and stand behind it, or you won't get any of his business."

Advocates of the package approach cite several advantages. Salesmen are trained to sell a complete line instead of individual products. This allows more efficient use of salesmen, results in reduced marketing costs, and therefore benefits the customer as well.

A single buyer in an oil company or a national oil monopoly can come to a single equipment source for one bid on an entire system. One buyer's discretion prevails. On maintenance, he returns to but one supplier for parts. If a system fails, he calls for instant service from a coordinated source responsible for performance of the entire system. Also, project logistics are greatly simplified.

**Foreign expansion.** As oil men went abroad to try to find more crude for their investment dollar and to win a share of the booming overseas market, supply men followed them.

The drilling and production machinery and equipment industry did a record $1.2 billion business in 1957. This was 5.5% above 1955, and this record was due to an 82.4% increase in exports during the 2-year period, according to the U. S. Department of Commerce.

**SUPPLIERS** have broadened their operations overseas, and equipment being loaded aboard foreign airliners is a common sight nowadays.

In 1957 foreign markets provided 20.4% of the U. S. equipment-manufacturing revenue. Exports have continued to increase in importance. Last year total industry sales were $860 million although domestic business declined slightly.

With oil technology no longer largely a monopoly of the U. S., American supply firms found that more aggressive sales abroad were not enough. They built foreign plants or licensed others in order to win access to markets otherwise closed to them because of high costs, dollar shortages, or long-term credit problems.

**Supply-store adjustments.** Suppliers have pared their own costs—and thereby the costs of equipment for the industry—several ways.

They have reduced the number of stores, eliminated "frill" services, broadened lines, and re-emphasized firing-line salesmen.

There will never again be as many supply stores as there were before the industry economy wave of the past 5 years, according to one major supplier. Improved transportation and communication have made a large number of stores unnecessary.

This was not revealed until retrenchment forced a hard look at operating practices. Now, in retrospect, the widespread system of stores is considered by some to be an "extravagance."

Another supplier has cut the number of stores, services, and employes, and has added lease-automatic-custody-transfer units and packaged water-flood units, among other nonconventional supply-house items.

"We have cut the number of stores about 50%," says another of the big supply companies. "We're designating fewer 'central' stores and are going to 'feeder' stores with small stocks, especially in new areas. This also fits better with oil companies' changing buying practices. It used to be that the tool pusher or superintendent could buy just about anything he wanted at the local store. Anymore, only emergency items are bought by these men and some companies even restrict this."

The answer for one supplier has been found in reduced services (having one delivery truck working out of a store instead of two), and putting top salesmen who were boosted to executive positions back on the firing line.

"We will maintain our stores," this company says, "we'll cut our services—we'd been giving the companies too much on a platter anyway—and we're keeping our key salesmen selling instead of moving them up in 'nonproduction' spots."

Two unusual companies say they have not felt the industry belt tightening and have no plans for retrenchment. But even they agreed it is a brand-new industry they are serving, and many old business practices must be discarded.

## Conflict in marketing—dealers vs. salesmen

**DEALERS** say salesmen—

Help solve their problems (56.9%*) or give practically no help (43.1%).

Do an over-all good job, are friendly (41.4%).

Are too company centered (15.5%).

Do not have enough authority (10.3%).

Use high pressure selling (3.5%).

Need to be better informed (3.5%).

*Percentage of those interviewed who gave this response.

**SALESMEN** say dealers—

Don't keep stations clean or well maintained (38.4%).

Are poor at handling credit and finances (34.6%).

Lack ability to sell (34.6%).

Need to train driveway salesmen better (23.1%).

Lack business sense (15.3%).

Are poor record keepers (15.3%).

# Dealers, salesmen both want better relations

**Tulsa University survey pinpoints friction between station operators and company salesmen. Big problems: Lack of training, poor communications.**

OIL companies generally still lack an effective training program for their own salesmen and dealers.

Despite some great advances in this field in recent years, the sad fact remains that company salesmen too often are inexperienced, many dealers lack knowledge of their business, and both are unhappy with each other.

These conclusions were drawn from a study just completed by Dr. Lloyd R. Saltzman and his students in marketing research at the University of Tulsa. The students interviewed sales managers, sales representatives and service-station dealers of both major and independent companies in Tulsa.

Their primary aim was to discover what the sales managers and dealers expect from the sales representatives and to determine if the objectives set by the salesmen themselves matched those held by the bosses and customers.

**Problem with salesmen.** The turnover rate for salesmen in the oil industry over the past year has been definitely increasing.

Saltzman noted that too many companies keep no termination records on why salesmen quit the firm. This means that important data are missing for any future campaign to improve the selection and training of salesmen.

In the matter of selecting salesmen, oil companies also apparently have taken a haphazard approach. Most companies recruit their salesmen from within their own company or through a college recruiting program. They mainly use application blanks, interviews, and reference checks as their selection techniques. Only one company depends on scientific testing of personality and aptitudes.

The interviewers also found that new salesmen usually lacked any sales experience. Nearly 30% of them had no previous work in petroleum, 77% had no experience in related fields, and nearly 62% had no work experience at all. Only 8 men of 26 interviewed had ever worked in a service station.

Saltzman said this lack of experience raises a big question: "How can the salesman expect to sell with conviction and authority and how can one expect the dealer to be loyal and cooperative if he has no confidence in the salesman?"

Training of salesmen to make up for this lack of experience also tends to be sketchy. About two-thirds of the salesmen get some dealer-management training—but the average initial training period is only about 3 months. One big void: Little or no training is provided the salesman in such areas as dealer selection, evaluation of site locations, and record keeping.

Though record keeping has long been considered a major reason for excessive dealer turnover, many salesmen were found to have no enthusiasm for teaching company recommended record-keeping systems.

The principal objectives of the few training programs for salesmen are to increase sales volume and improve dealer relations. Saltzman reported, however, that of the 11 companies reporting on results of sales training programs, only three companies mentioned increased sales and three listed better dealer relations. This means a poor correlation between the objectives of the program and the results, he said.

**Dealer reaction.** Nearly all companies expect their salesmen primarily to work closely with dealers and to help them solve their problems.

Some firms believe that in this respect their biggest problem with salesmen is lack of planning, initiative, and failure to convince their dealers.

Many dealers, for their part, do not believe the salesmen are doing too good a job. Nearly half of the 58 dealers interviewed believe their sales representatives are of no help in solving their service-station problems. The other half felt they were helped significantly with suggestions for improved station operation.

Another factor behind the dealers' apparent lack of confidence in their company salesmen is the general inexperience of the dealers themselves. Some 42 out of the 58 dealers sur-

veyed reported they received no training whatsoever in operation of a service station before starting their present stations. Refresher courses also were lacking.

The average dealer had from 3 to 5 years of previous experience in service station work and had operated his own station from 1 to 2 years.

Saltzman said it is evident that the fine present training programs which most oil companies have must be given to all new dealers. This way a high percentage of the dealers in time will have had the training necessary to compete successfully and stay in business during the highly competitive years ahead.

As for the dealers, they told the interviewers they felt the most important moves to increase profitability include a better margin in prices on gasoline, more company-paid advertising, and sale of products through dealers rather than discount houses. The average monthly gallonage for dealers in the study ranged from 15,000 to 20,000.

**Salesman's work load.** The average sales representative calls on from 14 to 17 dealers, making about four calls in a 10-hour day.

Majority of the salesmen call on their dealers once or twice a week. Most salesmen try to give some help to the dealers in their advertising, but less than half regularly help in sales promotion. An ever lesser number help dealers with their record keeping. Nearly all the salesmen relay dealer suggestions to the company and vice versa.

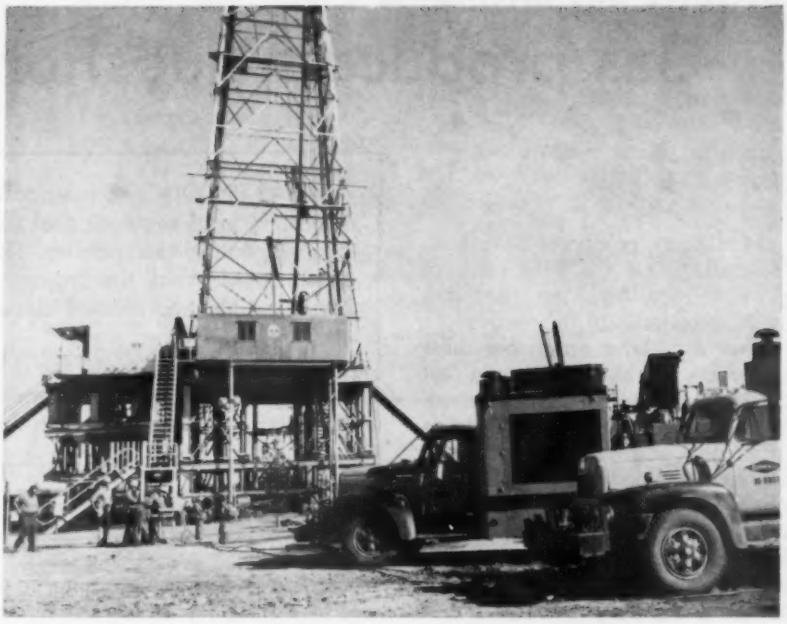
What can the company do to help them? Salesmen mentioned improved sales training, more flexible sales program, fewer stations to supervise, improved dealer relationships, and greater authority when working with dealers.

The salesmen also suggested these company actions:

**Dealer relations** should be improved and service-station work made more attractive.

**Communications** must be improved with company decisions concerning dealers made and relayed faster.

**Better training** must be practiced since dealers probably will expect more and more help from sales representatives in the future.



# Deep-fracturing record set

A RECORD deep-fracture treatment for Humble Oil & Refining Co. has been carried out in an Oklahoma well by Dowell Division of the Dow Chemical Co.

The Annie Schmidt 1, Sec. 20-8n-17w, Washita County, was treated through perforations from 17,216 to 17,340 ft.

Total depth of the well was 17,790 ft. and it was plugged back to 17,600 ft. The well was tested in the Springer formation. Treatment was made down 2⅞ tubing and the annulus between the tubing and 3½-in. casing, at pump rates of 6 to 8 bbl. per minute.

In the treatment, 25,000 gal. of Heviwater and about 12,500 lb. of 12-20 mesh sand were used. Dowell also ran 1,200 lb. of walnut shells, which were mixed in because of the excessive crushing of sand at the expected overburden pressures.

Bottom-hole temperature of the Humble well was above 250° F.

Three pump trucks and two twin-diesel standby pumpers were used on the project. The pumps were operated for over 2 hours at pressures of 9,000 psi. to 10,500 psi. with the temperature of the treating fluid averaging 185° F.

Photo above shows crews at work.

Last spring, Dowell set the previous deep-fracturing record in a West Texas well with treatments through perforations from 16,030 to 16,210 ft. in the Devonian (OGJ, June 5, p. 41). The well was Atlantic Refining Co.'s Lucas State 1, 25 miles west of Fort Stockton, Tex.

Before the West Texas job, the record in fracturing treatment was achieved at British-American Producing Co.'s Vera D. Hussy 1-X near Lindsay, Okla. Western Co. handled that treatment through perforations from 15,358 to 15,836 ft.

## Two offshore rigs hit by Hurricane Hattie

TWO Offshore Co. drilling units ran afoul ot Hurricane Hattie last week and suffered undetermined damage.

The three-legged Offshore No. 58, only commissioned in February, rode out the storm on location in the western Gulf of Mexico. The tender for the unit was hauled into a river for protection.

Offshore No. 55, a 5-year veteran, was being towed from Trinidad to New Orleans when the hurricane struck it south of Cuba. Crew of the barge was picked up by the tugboat and brought to safety. The $4-million barge was allowed to drift free as a derelict. It later washed upon a reef near the town of San Pedro in British Honduras.

*Incentive gas pricing—2*

# Gas producers question legality of low

**Henry Ralph**
Chief Editorial Writer

GAS PRODUCERS have taken a new approach to the problem of federal regulation of natural-gas field prices. They propose incentive gas pricing. FPC acceptance of the producers' thesis could break the logjam at the agency and end the confusion which has existed since the Supreme Court's 1954 decision in the Phillips' case.

This series presents the producers' case for incentive gas pricing. It is based on testimony at an FPC area-price hearing. The first article appeared in the October 30 Journal, Page 109.

FOR years producers have been contending that the field price of gas is too low from the standpoint of the economics of the industry.

Now they have proof that these low prices are also illegal, and that the law requires that they be raised.

The validity of this proof depends on whether or not the Federal Power Commission accepts their interpretation of the law and the regulatory theory upon which the producers have premised their case.

If the present commissioners accept this theory—and it is based on principles their predecessors laid down only a year ago—the producers' economic data constitute a very pertinent and formidable case.

The theory and the economic data were presented in elaborate detail at the Permian basin area-price hearing in September.

Perhaps the chief "theoretician" for the producers is Dr. J. Rhoads Foster of Washington, D. C., a consulting economist who has represented gas producers in many individual FPC cases. At the Permian hearing he laid down the legal basis for the producers' approach in great detail. Here is a condensation of his exposition:

**FPC's objective** is to find a fair price for gas as a commodity. This would be a "just and reasonable" price as required by the Natural Gas Act.

**To achieve this,** FPC must determine prices in producing areas that are adequate—but no higher than necessary—to maintain the gas supply in interstate commerce that is needed to meet the requirements of consumers.

## 1. Incentive price approach

The producers advocate adoption of what they call an "incentive-price" approach. It could also be called an "industry-cost" approach, or a "supply-cost" approach, and it corresponds with the "financial-requirements" approach which FPC itself has suggested as a possible basis for regulation.

The nut of this approach is that the fair price for gas as a commodity is a price which is adequate but no more than is necessary to compensate producers for taking the risks present in exploring for and developing the supplies needed by consumers dependent on the interstate market.

The legally "just and reasonable" price would provide the producers' revenue requirements as measured by the unavoidable cost to the industry of providing the needed supplies. This measure would cover the industry costs of exploration, development, and production of gas as a separate product to the extent that this can be segregated from the cost of finding oil. And it would also include a fair share of the cost of gas produced as a joint product with other hydrocarbons.

## 2. Cost-of-service approach

The producers' regulatory theory is quite a different thing from the "industry-cost-of-service" approach, which, it is suspected, may be advocated by some of the FPC staff and a good many of the intervenors speaking for distributors and consumers.

That method is much the same as the old cost-of-service rate-base formula applied to an individual producer, except that average costs of all (or a representative sample of) producers in an area are used to determine the cost of a thousand cubic feet of gas in a particular "test year."

All the producers hit hard at this theory, arguing that it is the prospect of future prices as compared with future costs that brings out new supplies of gas, not the actual costs during some past period in history.

"It is not a sensible or practical measure of reasonable gas prices," Foster testified. "There is no reliable functional relationship between expenditures and revenues realized in a single test year.

"Producers of gas have no legal obligation to provide productive capacity to meet consumer demands. Gas supplies depend primarily upon managerial appraisals of alternative investment opportunities. It cannot be expected that investments will be made without a prospect of profits commensurate with the risks of the industry."

Much testimony emphasized the lag—often 10 years or more—between the start of an exploratory program and the receipt of income from the sale of gas discovered by that program. This was to dem-

# Louisiana talks

THE STATE of Louisiana is studying the possibility of entering the business of producing, pipelining, and marketing natural gas as a means of cutting gas rates for industry.

The possibility is admittedly remote, but it is one method now being surveyed by the state administration to encourage more petrochemical and chemical plants to locate in Louisiana.

James S. Reily, state commissioner of administration under Gov. Jimmie H. Davis, told the Journal last week he is heading up the

# field prices

onstrate that comparing producers' costs and income in a single test year does not give a true picture.

To illustrate, it was pointed out that the industry as a whole has spent less for exploration and development in the years since 1946. Therefore the industry-cost-of-service method would indicate that the cost of finding gas is less now than in prior years, although producers' income from sale of gas is higher.

Such a conclusion would be exactly opposite from the facts. Moreover, the formula would continue to work backwards. The more the industry reduces its exploratory and development expenses because of low gas prices, the lower would be the indicated cost as the measure of what prices ought to be—and the lower would be the new supplies of gas for future needs.

### 3. Financial requirements

Foster told FPC how it can measure the financial requirements of the producing industry, and hence the reasonableness of gas prices, by anlyzing the statistics on such factors as:

**1. Present** and anticipated demand for gas and the volume of reserves needed to supply it.

**2. Rising importance** of gas relative to crude oil.

**3. Trends in costs** and income from gas as compared with oil.

**4. Inability** of crude-oil prices to carry the major part of total industry costs any longer.

**5. Influence** of higher gas prices on new supplies.

**6. The way** in which higher prices for gas now being produced will be an incentive to find additional reserves for the future.

After such data are before it, Foster said, FPC should use a two-step method in applying the incentive-price approach:

**Examine the general level** of producer prices.

**Then determine** if any individual price is unduly discriminatory.

The general level of producer prices, he said, is not unreasonably high or rising too rapidly if prospective new supplies are not excessive or are inadequate in relation to demand, and, at the same time, the price level is changing at about the same rate as the cost of finding and developing new supplies.

When it comes to deciding whether or not specific prices are unduly discriminatory in a legal sense, FPC should take a practical approach, he said. It should not upset contracts and industry practices where a particular price is not greatly at variance with the normal, or has a rational explanation, or does not have a seriously adverse effect on the public interest.

**The proof.** With this legal method of determining the reasonableness of gas prices laid down, Foster and other industry witnesses submitted a huge mass of statistical tables and charts, all showing that by any test the price of gas in the Permian basin and elsewhere generally is too low in comparison with finding costs and with future demand, and that an incentive price will produce new supplies.

Foster was backed by a dozen operating men in the producing industry who supported his conclusions as to trends with specific facts and figures drawn from the actual experience of the industry.

## Low field prices hold down gas exploration

PERMIAN basin producers gave FPC this example of how incentive gas prices work:

Prior to 1953, El Paso Natural Gas Co. was the only gas buyer in the basin. Drilling for gas was at a low level. In 1953, El Paso raised its price. Both wildcatting and development drilling for gas shot up, providing new reserves.

Activity soon began lagging again. But Transwestern Gas Transmission Co. entered the area with higher price offers in 1957 and spurred drilling. The current price, the producers say, is high enough to sustain development drilling but is not encouraging wildcatting for additional reserves.

# about producing and marketing its own natural gas

study which may result in legislation on the subject.

One approach, Reily said, would be to reduce or eliminate the state's natural-gas tax for industrial users only. The tax of 2.3 cents per 1,000 cu. ft. is two to three times that of neighboring Texas, Louisiana's chief rival on the Gulf Coast for new plants which use natural gas.

Whether such a tax incentive can be applied legally is one of the subjects of study.

Reily said Louisiana is concerned that natural-gas rates should be burdensome in a state that is finding more new gas today than any other state.

If the state went into the natural-gas business, it would face heavy legal and economic obstacles. Such a project would place the state in competition with private gas producers and pipeline operators, and would cost huge sums to put in operation.

Reily said the state doesn't intend to do anything "that's going to hurt business." But at the same time, Louisiana "still has to look after its own interests."

To finance such a state-operated project, Louisiana is talking of relying on its share of the $340 million in tidelands revenue held in escrow by the state and federal governments. Division of this money is yet to be settled.

Louisiana's interest in reducing industrial gas rates reportedly was touched off by the Chemical Manufacturers Association, which told state officials that rates are too high to attract new plants to Louisiana. Most of the new, or enlarged, petrochemical and chemical plants recently have gone to the upper Gulf Coast of Texas.

*Next week:*

**An Oil-man's Guide to Washington**

**MAJOR oil decisions--affecting every segment of the industry--are being made in Washington.**

**More than ever before, it is important to know:**

- **WHAT the climate is for oil in all branches of the federal Government.**
- **WHERE oil and gas matters are under study.**
- **WHO the key officials are and what they think about oil.**

**You can get this vital information next week from the Journal's Special Report—"An Oil-man's Guide to Washington."**

**Don't miss it.**

# Vancouver gas line shaping up

## Magna gathers $6 million for initial phase of project to move gas from B. C. mainland through plastic pipe.

MAGNA Pipe Line Co., Ltd., Vancouver, B. C., has sold $6 million worth of securities in the U. S. and Canada to finance initial phases of a gas pipeline from the British Columbia mainland to Vancouver Island.

Some $30 million will be spent to develop the system through 1967, introducing natural gas into a market now served by fuel oil and propane.

Magna will install two 19½-mile submarine pipelines of 4.85-in. inside diameter, flexible, steel-reinforced plastic from Ladner, B. C. across the Georgia Strait (OGJ, Jan. 16, p. 62).

A 75-mile 6-to-10-in. land line will be laid from the crossing point to Nanaimo in the north and Victoria in the south. Completion is planned by July 1963, but Magna hopes to finish in 1962.

A third submarine line is planned in 1965. The expansion program would also include a northward extension of the land line and a single submarine line back across the strait to Powell River, B. C., on the mainland. This would involve 115 miles of land line and 29 miles of marine line.

Magna has a contract with Westcoast Transmission Co., Ltd., to purchase 25,000 M.c.f. daily of natural gas in 1964, 30,000 M.c.f. daily in 1965, and 42,500 M.c.f. daily in 1966 and thereafter. Gas would be delivered to Magna through a connection with British Columbia Electric Co., Ltd., from Huntingdon, B. C., to Ladner.

Magna also proposes to purchase Natural Gas Transmission Co. and proceed with the NGT plan to build a 60-mile 10-in. line from Bremerton to Port Angeles on the Olympic Peninsula of Washington.

NGT would receive gas from El Paso Natural Gas Co., which is seeking permission from the U. S. Federal Power Commission to build a 61-mile 10-in. line from its main system south of Tacoma to Bremerton. The projects are to be completed by mid-1962.

Ralph K. Farris, president of Magna, is president of Northern Ontario Natural Gas Co., Ltd., and a director of Cascade Natural Gas Corp.

# Oil heat scores over gas in new housing project

OIL HEAT is stealing a march on natural gas in a large housing development in Wilmington, Del.

Natural-gas equipment, with its relatively low capital cost, has virtually taken over the new home market even where the annual cost of heating with oil is cheaper. Heating-oil marketers have been unable to counteract this advantage which the gas industry has in persuading builders to install gas equipment.

But the Wilmington venture, the first of its type, is an exception to the rule. And it should create a market for 1,000,000 bbl. of oil annually.

Humble Oil & Refining Co., a Wilmington builder, and an equipment manufacturer are offering a package with a big selling point: homes can be heated and cooled year round for the price of heating with gas alone.

Between 800 and 1,000 single-family dwellings ranging in price from $28,000 to $32,000 will be built in the project over the next 4 years. All will have integrated systems to combine heating, cooling, and hot water. Oil will fire the forced-air heating system and heat the water. Electric power will cool the homes.

Humble's Esso Standard, Eastern Region will stand behind the heating equipment as a part of each service and oil-supply agreement with the home owner.

Studies indicated a home could be heated for $140 less per year with oil than if gas were burned. Cost of electricity for air conditioning was estimated at $100 per year, considerably less than the difference in heating costs.

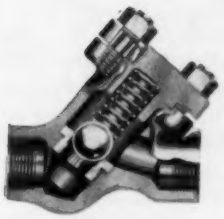
For the builder this was a strong point to use in selling the houses, in spite of more expensive equipment which raised his costs. The equipment itself was attractive, providing individual room temperature control. And Esso's willingness to back up performance was enough to put oil into the development.

Esso expects this venture may become a model for competing for the new-home business which now goes almost entirely to natural gas.

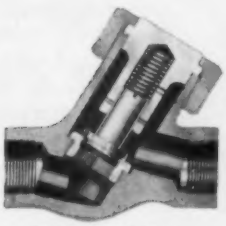
High Pressure Check Valve
Fig. 9160 10,000 lb WOG
Horizontal or Vertical

# Edward Check Valves give positive protection against flow reversal

Edward forged steel check valves are built for the rugged duty required in oilfield and refinery piping systems. This complete line of Rockwell-built valves is available in ball or piston type; screwed, flanged, or socket welding ends; union, screwed, bolted, or welded covers for pressures to 10,000 psi, temperatures to 1050F. Field tested interior design assures long life, positive seating with minimum pressure drop. Check valves are available up to 2″ in forged steel. Cast steel piston check valves and tilting disk check valves up to 18″. For details, contact your favorite oilfield supply store or write to Edward Valves, Inc., 1212 West 145th Street, East Chicago, Indiana. Subsidiary of Rockwell Manufacturing Company. 6020



Ball Check Valve
Fig. 4632, Bolted Bonnet
Rating: 600 lb at 900F
(2000 lb WOG)
Horizontal or Vertical



Piston Check Valve
Fig. 3578, Union Bonnet
Rating: 1500 lb at 850F
(3600 lb WOG)
Horizontal or Vertical

Edward Ball Check Valves are recommended for liquid services, especially where heavy, viscous fluids are encountered. Stainless steel ball disk is fully guided and closure is aided by stainless steel springs. Edward Piston Check Valves feature EValloy* 13% chromium stainless steel seat and disk, and Ironkote soft metal gasket for leakproof body-bonnet joint. Stainless steel spring assures positive seating.

*T.M. Reg. U.S. Pat. Off.

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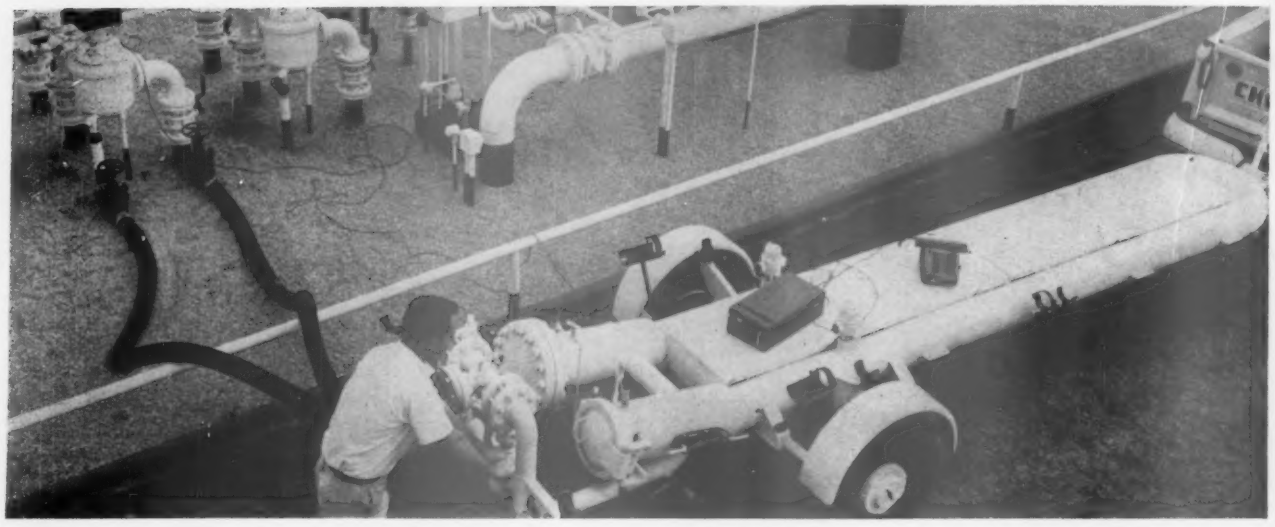

**PORTABLE** prover makes quick meter checks without interrupting flow. Pipeline companies and lease owners are furnished a . . .

# Contract service company uses photos to cut cost

A METER - PROVING service being offered by a Tulsa company may produce savings for pipelines and lease owners.

J. A. Halpine & Son, Inc., Halmor Services Division, says its service can:

**Provide regular checks** of pipelines, custody transfer units, and loading dock delivery banks without interrupting flow.

**Verify meter readings** by on-the-spot photographs. Pipeline and lease-owner representatives have to be on hand only for the initial test. Thereafter, the photographs take the place of witnesses.

Halpine's new portable provers—which do away with the need for permanent prover tanks—have been tested in 20 Oklahoma fields. The company now is offering the service for fees in the neighborhood of $30 to $70, depending on the number of meters involved, field location, and hook up and engineering expenses.

A two-man crew makes the first test on each meter. One man can operate the unit on additional tests.

**How it works.** Halpine says the prover can handle any type meter. It can check a meter 12 times during 1 hour in flows up to 600 bbl. an hour and pressures up to 1,200 psi.

The system includes a pulse generator, which is driven by the meter shaft; a piston prover barrel and switching manifold; two piston switches; and an electronic pulse counter.

The prover attaches to linkage near a meter. Block valves and automatic plugs divert the flow through the prover barrel.

The pulse generator issues 10,000 pulses for each barrel of crude—or whatever is being measured—that passes through the meter. Accuracy of the meter is determined by converting the pulses into barrels and then comparing that figure with the number of barrels shown on the

# Texas producer trying to get a pipeline connection

THE FIRST test of the Texas Railroad Commission's historic pipeline-connection order was still going strong last week.

Hearings before the commission in Austin opened October 25 on a complaint filed by B. A. Duffy, Abilene independent, against Crown Central Pipe Line Co. and Crown Central Petroleum Corp.

Duffy, supported by three Texas producer associations, is asking the commission to implement a 1958 directive by ordering Crown Central Pipe Line to connect his tank batteries in Haskell County Regular field in North Texas (OGJ, Oct. 2, p. 114).

The Austin proceeding is a show-cause hearing. The commission is calling on Crown Central to show why it has not complied with the policy order, which sets up ground rules under which pipelines must connect wells.

Wrangling over oil reserves and gathering costs consumed the first 2 days of the hearing, with prime testimony from Duffy witnesses and cross - examination by Raybourne Thompson, Houston attorney for Crown Central.

Testimony turned up the fact that a second common-carrier line, Service Pipe Line Co., also has a crude line near Duffy production. The hearing was recessed so that company could be brought into the hearing, and the proceeding resumed November 1.

**The Duffy case.** Principal witnesses for Duffy were B. P. Jackson, general manager for Duffy interests; E. L. Anders, Jr., Abilene

PHOTOGRAPH of test results.

## of meter proving

mechanical counter of the meter.

Prover volume and metered volume are corrected for temperature and pressure variations. A meter factor is reached by dividing the net prover volume by the net metered volume.

For example, if the meter records 10,000 bbl. but the prover shows that only 9,911 bbl. actually passed through the meter, the factor would be .9911. The pipeline company, in calculating future payments for production, would multiply the indicated flow by the meter factor and arrive at the correct flow.

Halpine will submit written reports of test results.

## under '58 order

consulting engineer; and Bruce Street, independent producer and pipeline operator of Graham, Tex.

Jackson told the commission that Crown Central has refused to connect its system to 19 wells in the Sojourner-Burson area of Haskell County Regular in violation of commission rules.

The wells, he said, produce about 240,000 bbl. of oil per year and all leases involved are within 6,000 to 11,000 ft. of Crown Central Pipe Line's Teague receiving station.

Crown Central, Jackson said, offered to extend a connection but with terms too severe to be acceptable. One such offer, he said, called for Duffy to pay $30,000 for the gathering system and own no interest in it. A second proposed that Crown Central lay and pay for the system, with Duffy to pay 10 cents per barrel gathering charge until the entire estimated expenses of $25,000 were recovered.

The oil now is trucked to Crown Central, Jackson said, at a cost of 11 cents per barrel. He said the trucking operation has resulted in losses of allowable and income due to bad weather and uncertain working conditions.

**Big reserve, quick payout.** Anders testified that the leases involved have a remaining recoverable primary reserve of 2,278,555 bbl. and a secondary reserve of 3,070,000 bbl. more, for a total of 5,348,555 bbl.

At the present producing rate, Anders said, a gathering system could be paid out in 2½ years with only a 5-cent tariff and in 1¼ years with a 10-cent tariff. If eight proved locations are drilled, a $30,000 line could be paid out in only 1¾ years with a 5-cent tariff and in only 10 months with a 10-cent tariff, he said.

Anders' reserves-and-payout figures were quickly challenged by Thompson for Crown Central.

The pipeline will show, he said, that a system could not be operated profitably on a 5-cent tariff. He contended there is a vast difference between Duffy's reserves figures and those of Crown Central. The pipeline's estimates, Thompson argued, show only 758,000 primary and 1,500,000 secondary for a total remaining recoverable reserve of 2,258,000 bbl.—roughly one-half the Anders estimate.

If payout of a gathering system in the field is as profitable as claimed by Anders, Thompson said, Duffy should be quite willing to build it himself. And Crown Central, he said, is willing for him to do it.

He asked Jackson why Duffy is attempting to force Crown Central to hook up his wells "when Service Pipe Line to the south might do it voluntarily?"

Duffy, Jackson replied, already has a market with Crown Central and isn't interested in trying to develop a new one. Further, he said, Duffy is not staffed for pipeline operating and has no desire to get into that business.

**Oil trucking growing.** Street, Duffy's third witness, told the commission its 1958 order so far has not influenced pipelines to connect more wells.

The figures show, he said, that the portion of Texas oil production trucked to market has increased from only 3% in 1956 to 5% in 1961.

This, he argued, is an unhealthy trend for independent operators and the state generally. Enforcement of the 1958 order is vital for keeping the independent operator alive, Street contended.

**The other side.** Witnesses for Crown Central were slated to take over the spotlight late last week. A spokesman for Service Pipeline Co. also was due to appear.

Main line of defense was expected to be contentions that reserves are not as large as Duffy contends, and that laying a gathering system to connect these leases is not economically feasible.

## Gulf begins partial operations at plant when picketing ends

GULF Oil Corp.'s refinery at Port Arthur, Tex., returned to partial operation last week after 180 striking machinists removed their pickets.

The action allowed 3,500 members of the Oil, Chemical, and Atomic Workers Union to return to work, although the machinists remained on strike.

A federal mediator, Ray M. Majure of Houston, stepped into the dispute between the company and the machinists union, which has canceled its contract and authorized its workers' committee to call a strike.

Majure met separately with the company and the union. Then he arranged a joint meeting to discuss the issues of job security and contract work, the basic disputes in writing a new work agreement.

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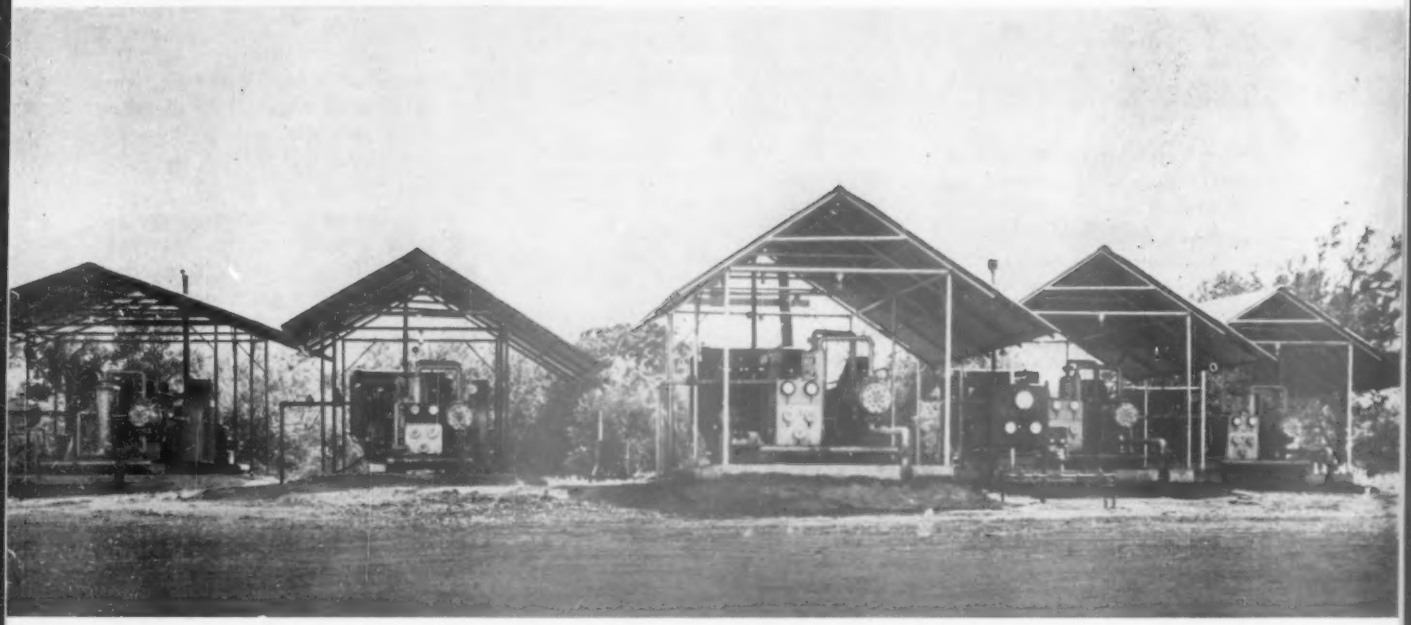
# ENGINEERED SECONDARY RECOVERY INSTALLATIONS



This battery of heavy duty compressor units supplied by Mid-Continent is helping to increase oil production for our Corsicana, Texas customer.

Whatever or wherever your secondary recovery equipment requirements, Mid-Continent can assist with trained personnel and a complete line of quality products to meet your exact needs. Following is a partial list of secondary recovery equipment available through Mid-Continent:

| | |
|---|---|
| Injection Pumps | Controls, Safety |
| Engines | Meters & Regulators |
| Compressors | Filters, Graded Bed |
| Valves | Filters, Individual Well |
| Control Panels | Welding Fittings & Flanges |
| Pressure & Flow Recorders | Grooved Couplings & Fittings |
| Controls, Pneumatic | Gauges |

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# How southwestern refinery runs looked in September

HERE are figures on crude runs in southwestern states where data are available from state regulatory agencies.

## Arkansas

(Refinery runs in barrels daily)

| Company and location— | September | August | Sept. 1960 |
|---|---|---|---|
| American, El Dorado | 38,065 | 37,771 | 31,292 |
| Lion, El Dorado | 27,207 | 34,051 | 33,766 |
| Macmillan, Norphlet | 2,805 | 2,789 | 3,632 |
| Other | 6,145 | 5,818 | 5,478 |
| Total Arkansas | 74,222 | 80,429 | 74,168 |

## Louisiana

| | | | |
|---|---|---|---|
| Cities Service, Lake Charles | 175,345 | 171,964 | 165,052 |
| Continental, Lake Charles | 50,245 | 53,501 | 51,715 |
| Humble, Baton Rouge | 266,313 | 293,241 | 274,319 |
| Ingram, Meraux | 19,328 | 19,118 | 17,248 |
| Shell, Norco | 113,818 | 110,791 | 99,168 |
| Tenneco, Chalmette | 46,359 | 36,338 | 38,028 |
| Other | 7,549 | 7,704 | 7,833 |
| Total Louisiana | 678,957 | 692,657 | 653,363 |

## Mississippi

| | | | |
|---|---|---|---|
| Paluxy, Yazoo City | 2,212 | 2,095 | 1,682 |
| Pontiac, Hattiesburg | 15,720 | 15,509 | 15,703 |
| Southland, Sandersville | 5,421 | 5,458 | 3,777 |
| Total Mississippi | 23,353 | 23,062 | 21,162 |

## Texas

| | | | |
|---|---|---|---|
| American, Texas City | 70,005 | 103,471 | 127,034 |
| Am. Petrofina: | | | |
| Mount Pleasant | 15,905 | 18,009 | 15,506 |
| Wichita Falls | 8,167 | 9,274 | 6,799 |
| Atlantic, Port Arthur | 53,975 | 67,113 | 30,804 |
| Col-Tex, Colorado City | 7,513 | 10,040 | 7,621 |
| Continental, Wichita Falls | 12,867 | 10,462 | 12,825 |
| Cosden, Big Spring | 27,763 | 28,065 | 29,977 |
| Crown Cent., Houston | 31,618 | 34,608 | 34,459 |
| Delhi-Taylor: | | | |
| Corpus Christi | 32,989 | 41,134 | 34,199 |
| Port Isabel | 4,904 | 5,102 | 1,139 |
| Eddy, Houston | 1,874 | 1,926 | 2,003 |
| El Paso, Odessa | 15,616 | 11,181 | 14,169 |
| Gulf, Port Arthur | 200,748 | 269,857 | 266,484 |
| Howell, San Antonio | (*) | 2,391 | 2,357 |
| Humble, Baytown | 197,605 | 247,513 | 286,614 |
| La Gloria, Tyler | 16,676 | 16,989 | 16,336 |
| Mobil, Beaumont | 170,506 | 200,388 | 196,106 |
| Phillips: | | | |
| Phillips | 67,688 | 71,083 | 54,032 |
| Sweeny | 58,772 | 68,041 | 58,332 |
| Plymouth, Texas City | 13,457 | (*) | 22,856 |
| Pontiac, Corpus Christi | 44,734 | 49,258 | 48,132 |
| Premier: | | | |
| Fort Worth | 7,536 | 6,980 | 7,558 |
| Longview | 2,784 | 2,904 | 4,295 |
| Pure, Nederland | 61,338 | 80,874 | 75,118 |
| Shamrock, Sunray | 25,507 | 25,717 | 24,240 |
| Shell, Houston | 116,303 | 98,108 | 108,144 |
| Signal, Houston | 55,192 | 56,197 | 48,357 |
| Sinclair: | | | |
| Corpus Christi | 22,141 | 19,929 | 27,362 |
| Houston | 145,666 | 128,797 | 125,031 |
| Skelly, Longview | 3,387 | 3,638 | 3,061 |
| Southwestern, Corpus Christi | 35,546 | 29,618 | 33,161 |
| Stand. Tex., El Paso | 50,663 | 48,133 | 41,092 |
| Suntide, Corpus Christi | 39,626 | 40,560 | 39,547 |
| Texaco: | | | |
| Amarillo | 16,357 | 16,269 | 16,347 |
| El Paso | 2,735 | 11,664 | 14,545 |
| Port Arthur | †217,848 | 281,175 | 238,266 |
| Port Neches | 39,284 | 41,932 | 40,723 |
| Texas City, Texas City | 10,316 | 35,020 | 27,129 |
| Other | 14,697 | 22,704 | 19,716 |
| Total Texas | 1,920,308 | 2,216,034 | 2,161,476 |

*Not reported. †Includes condensate.

## Processing briefs

**Catalytic cracking** and an alkylation unit will be built at Frontier Refining Co.'s Salt Lake City refinery. The $2,750,000 installation will be owned by Elco Leasing Co., Chicago, and leased to Frontier. Litwin Engineering Co. is contractor.

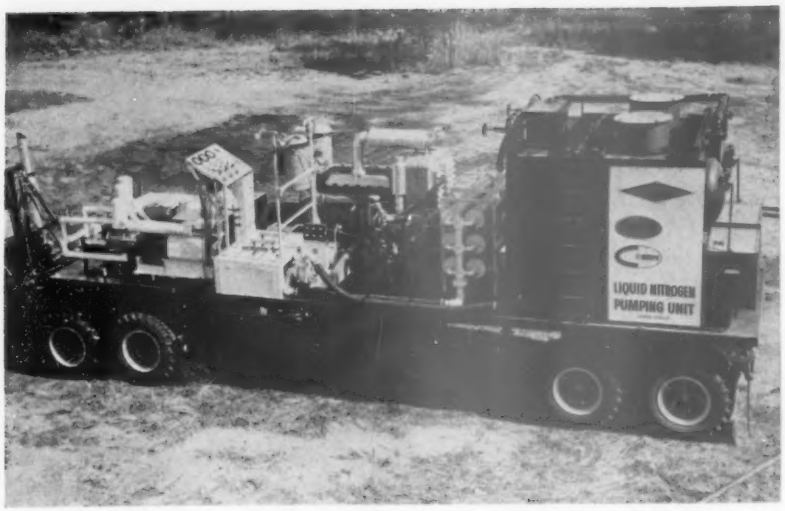
**New asphalt sealing** product is being manufactured by Lion Oil Co. at its El Dorado, Ark., refinery. According to Lion, the new product preserves shale and other earth formations from deterioration after being exposed to the air during excavations. The sealant maintains the formation as a solid base for the pouring of concrete.

**Construction bids** have been asked for by Shell Oil Co. of Canada on the 31,000 - bbl. - refinery which it plans to build near Oakville, Ont. The five companies asked to submit bids were Ralph M. Parsons Co. of Canada, Ltd., Fluor Corp. of Canada, Ltd., Foster Wheeler Ltd., and C. F. Braun & Co. Deadline for bids is January 2. Completion date is set for 1963. Process equipment which will be arranged in a U shape around a central control room will include distillation, vacuum flashing, catalytic cracking and reforming, alkylation, and hydrodesulfurization.

**Gas processing** plant will be built by Phillips Petroleum 17 miles northwest of Freer, in Webb County, Texas. Capacity will be 150,000 M.c.f.d., producing 85,000 gal. of propane, LPG, and natural gasoline. Completion is set for March 1962.

**Petrochemical expansion** has been completed at Crown Central's Houston refinery. New units include a Udex extraction unit with a feed capacity of 5,000 bbl. per day for producing benzene, toluene, and mixed xylenes; a Detol unit for converting toluene to benzene; and a xylene splitter for producing orthoxylene.

**Gas processing** plant construction has started at Tower Oil & Gas Co.'s site 8 miles north of Shawnee in Converse County, Wyoming. The $650,000 plant will have capacity of 7,500 M.c.f.d. and yield 20,000 gal. of liquid product daily. Completion is slated for December.




# Big nitrogen pumper tested

A NITROGEN-conversion plant on wheels is the key feature in a technique aimed at getting quicker and more complete return of fracturing fluids pumped into wells.

The $165,000 trailer-mounted pumper unit (shown above) turns liquid nitrogen delivered from a transport truck at −310° F. into a vapor with a temperature of 70° F.

Addition of the gas to the fracturing fluid increases velocity of fluid going down hole, permitting the faster and more complete return. The gas is mixed with the fracturing fluid in the wellhead.

The unit was developed by Dowell Division of Dow Chemical Co., Air Reduction Co., and the Cosmodyne Corp.

Dowell is testing the unit in Oklahoma.

The big pumper can discharge up to 330,000 scf. of gaseous nitrogen per hour at pressures up to 10,000 psi.

## Explosions at three refineries injure 11 and damage four units

EXPLOSIONS injured 11 employes and damaged units at three refineries in the United States last week.

Companies sustaining damage were DX Sunray in Tulsa, Continental at Lake Charles, and Humble at Baytown.

Five DX Sunray workers were burned in a fire and blast at the company's petrochemical section. Fire first started in the Hydeal unit and spread to an adjoining Udex unit. Damage to the Hydeal unit was light, but extensive repairs will be required for the Udex section.

At Lake Charles, a gas leak in the alkylation compressor unit was responsible for a flash explosion from a nearby boiler plant, injuring four workers. The fire was confined to a small area. The 52,000-bbl. refinery was shut down immediately but resumed operations the next day.

The Lake Charles plant, built in 1941, had never had a previous major accident.

At Humble's Baytown plant a hydrodesulfurization unit sustained minor damage and two persons were injured in an explosion.

## Pipeline briefs

**A products line** may be built in western Oregon to serve Portland, Albany, and Eugene. Southern Pacific Pipe Lines, Inc., is considering building such a line. Part of the line probably would follow the railroad's right-of-way. About 100 miles of line is included in the proposal.

**Plastic tubing** is being used to repair Ohio Fuel Gas Co. service-line connections in Columbus, Ohio. Early test results indicate the method cuts replacement costs by more than half, the company says. Plastic tubing is fed through deteriorated steel pipe and connected with special fittings. This eliminated need for breaking pavement. Customer service lines average about 40 ft. in length.

**A new safety record** was achieved by the gas industry in the second quarter of 1961, according to American Gas Association. An AGA spot check shows there were 5.35 disabling injuries per million manhours—a record low—compared with 6.25 a year earlier.

**The Texas attorney general** has approved refunds to gas pipelines which paid the state's 1959 severance-beneficiary gas tax under protest. The tax law is now defunct.

**Crude from Tule Creek** field in Roosevelt County, Montana, will be delivered to the Poplar gathering system and thence to Butte Pipeline by a 22-mile 4-in. pipeline to be built by Murphy Corp. and Placid Oil. The line, to be operated by Murphy, will handle 1,500 bbl. daily.

**A products terminal** is being built by Kaneb Pipe Line Co. near Miltonvale, Kans. Completion is set for next January. It will be the first terminal on Kaneb's products-pipeline system in Kansas. The company operates three other terminals in Nebraska and South Dakota.

**Costs of natural gas** to interstate pipeline companies continue to rise, along with volume of sales. FPC reports these companies bought 8,106,413,313 M.c.f. in 1960 at an average price of 15.6 cents per M.c.f. This compares with 7.519,-992,780 M.c.f. in 1959, when the price averaged 14.3 cents. In 1958 the average price was 13 cents, and in 1957 it was 12 cents.

# Britain ready to okay LNG imports

**Cabinet expected to announce it has approved first big-scale importation of liquid gas from North Africa. Project has been held up because of coal-industry opposition, but apparently government is now sold on plan.**

GREAT Britain is just about to invest almost $30 million to import 10% of its present gas supply in liquid form from North Africa by tanker.

It has almost—but not quite—taken an act of Parliament to get the project afloat. The scheme for the first large-scale importation of liquefied natural gas has been hanging fire for months, largely because of opposition from the nationalized British coal industry. Last week it appeared the project will be given the government's official go ahead.

London sources expect the British cabinet's sanction for the project any day, without the coal industry's requested delay for a new study on British plants which manufacture town gas from coal by the Lurgi method.

The coal industry has hoped that a governmental decision would be delayed until after a joint coal-and-gas study of Lurgi plants already in operation in the country. It is now obvious that the British Government is leaning toward the Gas Council's stand that gas imports and gas manufacture by the Lurgi plants are complementary.

The fact that building the shore installations and the ships needed to import gas will take at least 2 or 3 years also gives apprenhensive coal people a chance to get used to the idea.

**Action urged.** More than a month ago a select committee of the House of Commons endorsed the project and urged the government to act without delay because it found the country's gas industry badly in need of a cheaper product (OGJ, Sept. 18, p. 81).

The select committee said all data presented to it indicated that Saharan natural gas, liquefied at a Mediterranean plant and shipped to Britain by refrigerated tanker, would not only be cheaper but of much higher calorific value than anything that could be produced domestically from coal.

Here is the plan expected to be approved by the British Cabinet:

**A $29.4-million investment,** all of it in England for the equipment and installations necessary to handle the liquefied gas once it reaches Canvey Island in the Thames.

**About $8.4 million** of that outlay would be for shore installation and storage, including five 2,000-ton refrigerated tanks. Pipeline construction needed to put the gas into the British distribution system is not included.

**The remaining $21 million** would go into a reformer to convert the liquefied methane into the lower calorific town gas.

**Two tankers** of about 26,000 tons, each capable of carrying 11,000 tons of the liquefied gas (about 575 000 M.c.f.) will be built and chartered by British Methane, Ltd., a joint venture of Conch International and the British Gas Council. One of the vessels will be built and owned by Conch International and the other by Methane Tanker Finance, a private British firm.

The system would give the British gas system 100,000 M.c.f. of Saharan natural gas daily, which would convert to 160,000 M.c.f. of town gas. It has been estimated that this could be delivered to the country's seven area gas boards at a cost of about 88 cents per M.c.f. compared with a manufactured gas cost ranging from $1.07 to $1.75, depending on which method of manufacture is used.

The liquefaction plant would be financed and built on the North African Mediterranean coast by Cie Algierienne du Methane Liquid (CAMEL) in which Conch International would have a half interest. The remaining interest would be held by the French producing companies SN Repal and CFP(A), who discovered the big Hassi R'Mel gas field, and Soc. Algerie de Development, Air Liquide, and the official Bureau de Recherches de Petrole. A 24-in. pipeline already connects the big gas field with the Mediterranean area.

## Underground-gas-storage sites studied

BRITAIN'S first underground-gas-storage project will probably be built in a water-bearing sandstone strata 800 ft. below the surface in the Midlands or Northeast Yorkshire.

The British Gas Council believes its best bet for the first such project—slated in 3 or 4 years—is an area near Winchester where geological studies appear to be favorable. The Gas Council has found a sandstone section 50 to 75 ft. thick which it believes will hold 10,000,000 M.c.f. of gas.

Sir Henry Jones, chairman of the Gas Council, says three Midlands sites, plus one in Northeast Yorkshire, may provide underground storage for up to 60,000,000 M.c.f. of gas for peak-shaving purposes in the national British gas grid of pipelines.

# Over-all crude flow up

## August figures show foreign crude output took a dip, but U. S. gain gives total production an upward nudge.

FOREIGN crude production dipped slightly in August, but output in the U. S., up after a lag during the preceding month, pushed free-world oil fields to an over-all gain.

Algerian production was off 104,300 bbl. daily—about one-third of total output—due to the shutdown of the pipeline from CREPS' Edjele oil fields in the wake of the French-Tunisian dispute over Bizerte. This decline, combined with lower production in Kuwait and Indonesia, offset gains by other major oil-producing countries.

Nigerian production tripled in 2 months to 64,800 bbl. daily. This reflects the opening in spring of a new pipeline and terminal facilities by Shell-BP Development Co.

**Trend over the last year**
(Thousands of barrels)

| | Western Hemisphere less U. S. | Middle East | Total free World less U. S. |
|---|---|---|---|
| **1960** | | | |
| August | 4,299.4 | 5,148.0 | 10,570.1 |
| September | 4,311.3 | 5,500.2 | 10,941.3 |
| October | 4,243.9 | 5,630.2 | 11,104.5 |
| November | 4,206.8 | 5,482.2 | 10,964.2 |
| December | 4,341.2 | 5,550.1 | 11,152.2 |
| **1961** | | | |
| January | 4,594.1 | 5,568.1 | 11,418.8 |
| February | 4,616.9 | 5,697.7 | 11,572.8 |
| March | 4,448.6 | 5,764.1 | 11,501.1 |
| April | 4,287.9 | 5,558.7 | 11,151.7 |
| May | 4,395.3 | 5,519.6 | 11,271.3 |
| June | 4,436.3 | 5,750.1 | 11,575.1 |
| July | 4,457.9 | 5,525.1 | 11,348.0 |
| August | 4,511.9 | 5,569.4 | 11,328.8 |

## World-wide crude production: Daily average in thousands of barrels

| Country— | Aug. 1961 | July 1961 | Aug. 1960 |
|---|---|---|---|
| **Western Hemisphere** | | | |
| Argentina | 228.6 | 228.6 | 187.1 |
| Bolivia | 7.2 | 7.6 | 9.0 |
| Brazil | 95.0 | 95.0 | 81.1 |
| Canada | 635.0 | 625.0 | 491.8 |
| Chile | 26.9 | 26.9 | 19.8 |
| Colombia | 145.7 | 144.1 | 111.7 |
| Cuba | 0.2 | 0.2 | 0.2 |
| Ecuador | 8.4 | 8.4 | 7.6 |
| Mexico | 290.0 | 290.0 | 288.7 |
| Peru | 52.8 | 52.8 | 53.1 |
| Trinidad | 123.1 | 123.1 | 121.3 |
| Venezuela | 2,899.0 | 2,856.2 | 2,928.0 |
| Total | 4,511.9 | 4,457.9 | 4,299.4 |
| **Europe** | | | |
| Austria | 44.7 | 44.7 | 45.8 |
| France | 44.8 | 41.4 | 41.2 |
| West Germany | 122.8 | 121.3 | 107.0 |
| Italy | 38.7 | 43.8 | 42.6 |
| Netherlands | 37.4 | 37.4 | 37.2 |
| United Kingdom | 1.7 | 1.7 | 1.7 |
| Yugoslavia | 27.5 | 27.5 | 23.2 |
| Total | 317.6 | 317.8 | 298.7 |
| **Middle East** | | | |
| Bahrain | 45.1 | 45.0 | 45.1 |
| Iran* | 1,262.0 | 1,203.0 | 1,049.0 |
| Iraq† | 1,015.7 | 999.9 | 985.9 |
| Israel | 2.3 | 2.3 | 2.4 |
| Kuwait | 1,538.5 | 1,619.0 | 1,589.9 |
| Neutral Zone‡ | 174.3 | 187.8 | 135.0 |
| Qatar | 168.6 | 179.5 | 174.2 |
| Saudi Arabia | 1,355.2 | 1,280.9 | 1,159.7 |
| Turkey | 7.7 | 7.7 | 6.8 |
| Total | 5,569.4 | 5,525.1 | 5,148.0 |

| Country— | Aug. 1961 | July 1961 | Aug. 1960 |
|---|---|---|---|
| **Other Asia** | | | |
| British Borneo | 90.0 | 90.0 | 90.0 |
| Burma | 10.5 | 10.5 | 10.8 |
| India | 8.5 | 8.5 | 8.5 |
| Indonesia | 425.5 | 446.8 | 413.3 |
| Japan | 13.5 | 13.5 | 10.1 |
| New Guinea | 2.7 | 2.8 | 4.8 |
| Pakistan | 5.9 | 5.9 | 5.9 |
| Total | 556.6 | 578.0 | 543.4 |
| **Africa** | | | |
| Algeria | 216.4 | 320.7 | 178.8 |
| Angola | 1.5 | 1.5 | 1.2 |
| Egypt | 71.7 | 71.7 | 64.4 |
| Middle Congo | 2.2 | 2.0 | |
| Gabon | 15.0 | 14.7 | 16.5 |
| Morocco | 1.7 | 1.7 | 1.9 |
| Nigeria | 64.8 | 56.9 | 17.8 |
| Total | 373.3 | 469.2 | 280.6 |
| **Free world** | | | |
| Foreign | 11,328.8 | 11,348.0 | 10,570.1 |
| United States | 7,103.8 | 6,958.0 | 6,940.2 |
| Total | 18,432.6 | 18,306.0 | 17,510.3 |
| **Communist countries in soviet orbit** | | | |
| Romania | 234.0 | 234.0 | 231.0 |
| Russia | 3,316.0 | 3,316.0 | 3,027.0 |
| Other Communist | 100.0 | 100.0 | 100.0 |
| Total | 3,650.0 | 3,650.0 | 3,358.0 |
| **WORLD TOTAL** | **22,082.6** | **21,956.0** | **20,868.3** |

Figures are from reliable industry reports or government sources. Estimates are made where complete reports are lacking. *Includes estimated 7,000 bbl. daily from Naft-i-shah field not operated by consortium companies. †Includes production from Naft Khaneh field, operated by Iraq Government. ‡Includes offshore production by Japanese interests.

# Octanes at 1950 cost

After years of rising costs for materials and labor, this may seem like an extravagant statement, but "Ethyl" antiknock compounds today cost just about the same as in 1950.

Octane improvement through antiknocks, always an economical, flexible method, is now even more attractive. A variety of antiknocks that give greater cost effectiveness in selected stocks, plus current antiknock cost, makes the increased use of antiknocks a more attractive route than ever toward the most economical production of gasoline.

In addition to offering low octane improvement costs, lead antiknock compounds provide an important road-performance bonus—a bonus that can come only from antiknocks and which increases with higher lead concentrations. Further, gasoline sensitivity can be decreased through the use of antiknocks.

**These factors all add up to the need for a new look at octane-improvement costs and a reappraisal of the balance between antiknocks and processing.**

Ethyl will be glad to help in evaluating your octane-improvement program. Linear-programming specialists will assist you in determining the proper allocation of components and optimum antiknock concentration, as well as selecting the most effective antiknock compounds from the wide range now available.

"Ethyl" antiknock compounds, always a good buy, are now even better than ever. Ask your Ethyl representative how you can use them to the greatest advantage.

## Ethyl Corporation

NEW YORK · TULSA · CHICAGO · HOUSTON · LOS ANGELES

**ETHYL CORPORATION OF CANADA LIMITED,** TORONTO · **ETHYL U. S. A. (EXPORT)** N. Y. 17, N. Y.

# OPEC still plagued by growing pains

**Lack of unity among members also evident because of Iraq's absence from third full-scale conference. Apparently not much was achieved.**

THE Organization of Petroleum Exporting Countries held its third full-scale conference in Tehran last week minus one of its members and obviously still in the throes of getting organized.

Iraq did not attend the meeting. Fouad Rouhani of Iran, OPEC's first secretary general, said Iraq's absence was "evidently because of the participation of Kuwait." He emphasized, however, that Iraq is not pulling out of the group which seeks to stabilize oil prices and obtain a better profit share for producing countries.

The absence of Iraqi delegates underscored one of OPEC's major hurdles—unity among the producing nations. Iraq was conspicuously absent at the third Arab Oil Congress held the previous week in Alexandria, Egypt. Iraq's Premier, Gen. Abdul Karim Kassim, claims Kuwait as an "integral" part of Iraqi territory and is at odds with his Arab neighbors because all have recognized Kuwait's independence.

There is no reason at this point to believe that Iraq's absence at the OPEC conference will have any effect on member-country support for Iraq in its dispute with Iraq Petroleum Co. Nearly all OPEC members are already on record as supporting Iraq in its stand for a bigger share of IPC profits and its demand for a direct financial interest in the company.

The major issues which OPEC is expected to tackle undoubtedly claimed the attention of the delegates last week at Tehran, but essential studies which various departments and committees of the organization are preparing have not been completed.

One such study has already been assigned to Arthur D. Little Co., an American industrial consulting firm. Its primary purpose is to give OPEC what it regards as a definite study of rates of return on oil-company investments in producing countries, but it will probably delve into the pricing problems that are regarded as vital by all the OPEC members. The Little study is now expected to be completed sometime late this year and will be available for the next OPEC conference in 6 months.

A second study comparing the rates of return on oil-company investments with those of other industries will probably be given to the Economist Intelligence Unit, London.

**Organizing pains.** In the meantime, OPEC is occupied with its own internal organization. It is already suffering growing pains. The skeleton organization set up in permanent headquarters in Geneva has outgrown its quarters. OPEC is now looking for office space in the Swiss capital of at least 30 rooms to accommodate its planned future expansion.

The permanent OPEC staff is now divided into four departments, with the subdivided technical department — headed by Ghanim al Ukaili, an Iraqi — considered the most important.

This is divided into five sections, each responsible for carrying out studies for the conference in its respective field.

The geological section will be headed by a still unnamed Venezuelan. The production section, which will deal with production problems and reserves of member countries, is headed by Dr. P. Mina from Iran.

The marketing section, to study world oil supply and demand trends for oil, natural gas, and other energy sources, is headed by M. A. Maghavami from Iran. The legal section is headed by Dr. J. Noguera, a Venezuelan.

The economic and financial section will study all financial phases of the industry including operational costs, taxation, tariffs, quota, and customs questions. It has the big aim of trying to standardize accounting systems in all producing countries. This section will be headed by an Iraqi who has not yet been named.

The administrative department of OPEC, headed by Hassan Razavi, an Iranian, is already set up and functioning in Geneva. The same is true of the public-relations department, headed by Sadek Husseini, who was appointed in September.

The enforcement department, which will have the executive responsibility for seeing that decisions of the conference are put into effect by member countries, is still to be set up. It will be headed by a Venezuelan.

# Turkey gets a 1,000-bbl. well

TURKISH PETROLEUM Corp., has brought in a 1,000-bbl., southeastern Turkey discovery in the same area as an earlier 535-bbl. find, and the government is making plans for a 310-mile outlet to the Mediterranean coast.

The state-owned company brought in Kurtalan 1 about 33 miles east of Batman and 16 miles east of Garzan oil fields.

Garzan is the source of Turkey's only commercial oil production so far, with an output of about 7,700 bbl. daily. Output of the 33°-gravity crude, with 0.1% water cut, is from 5,456-5,742 ft.

The find is in the same vicinity as Magrip 1, which came in as a 535-bbl.-daily discovery in August. Magrip produces 21° crude from a section between 5,660-5,873 ft. Both wells are south of a dry hole drilled earlier by Esso, and are on acreage given up earlier by the local Jersey affiliate which has withdrawn from exploration in the country.

The proposed 10 and 12-in. pipeline would move 30,000 bbl. daily of crude either to Iskenderun, a port on the eastern Mediterranean, or to Mersin, further west on the coast, where a 65,000-bbl. refinery is being built by Mobil, British Petroleum, and Shell.

# Foreign drilling rate stays high

FOREIGN drilling continues at a high level with 831 rotary rigs making new hole in November.

Another 1,820 rotaries were active in the U. S. early in the month, while 145 outfits were in service in Canada. This brought the free-world total to 2,796.

| | Nov. 1961 | April 1961 | Oct. 1960 |
|---|---|---|---|
| **LATIN AMERICA** | | | |
| Argentina | 109 | 109 | 109 |
| Bolivia | 14 | 15 | 15 |
| Brazil | 67 | 63 | 39 |
| British Honduras | 1 | 1 | ... |
| Colombia | 22 | 16 | 14 |
| Chile | 6 | 6 | 4 |
| Costa Rica | | | 1 |
| Dominican Republic | 1 | 1 | 1 |
| Ecuador | 6 | 7 | 3 |
| Guatemala | 1 | ... | ... |
| Mexico | 147 | 144 | 144 |
| Panama | 1 | 1 | ... |
| Peru | 12 | 12 | 11 |
| Trinidad | 23 | 23 | 22 |
| Venezuela | 26 | 29 | 43 |
| Total | 436 | 427 | 406 |
| **MIDDLE EAST** | | | |
| Bahrain | | 1 | 1 |
| Iran | 12 | 13 | 14 |
| Iraq | 7 | 6 | 11 |
| Israel | 4 | 4 | 4 |
| Kuwait | 3 | 4 | 3 |
| Neutral Zone | 5 | 5 | 5 |
| Qatar | 1 | 1 | 2 |
| Saudi Arabia | 3 | 4 | 3 |
| South Arabia | 3 | 3 | 2 |
| Syria | 2 | 2 | 2 |
| Turkey | 11 | 11 | 11 |
| Total | 51 | 54 | 58 |
| **WESTERN EUROPE** | | | |
| Austria | 9 | 9 | 9 |
| France | 31 | 27 | 30 |
| West Germany | 88 | 88 | 100 |
| Greece | | 1 | |
| Italy | 31 | 31 | 31 |
| Netherlands | 4 | 4 | 4 |
| Spain | 7 | 7 | 6 |
| Switzerland | 1 | 1 | 1 |
| U. K. | 2 | 2 | 4 |
| Total | 173 | 170 | 185 |
| **AFRICA** | | | |
| Algeria | 34 | 38 | 38 |
| Angola | 3 | 3 | 3 |
| Egypt | 18 | 18 | 13 |
| Senegal | 1 | 4 | 1 |
| Gabon | 3 | 2 | 6 |
| Gambia | 1 | 1 | 1 |
| Ivory Coast | 1 | 1 | |
| Libya | 36 | 31 | 35 |
| Mauritania | 1 | | |
| Middle Congo | | 1 | 1 |
| Morocco | 1 | 1 | 1 |
| Nigeria | 3 | 4 | 5 |
| Spanish Sahara | 1 | 1 | 1 |
| Somalia | 2 | 2 | 2 |
| Kenya | | 1 | |
| Tunisia | 2 | 1 | 1 |
| Total | 107 | 109 | 108 |
| **ASIA-PACIFIC** | | | |
| Australia | 5 | 4 | 4 |
| British Borneo | 2 | 2 | 2 |
| Burma | 4 | 3 | 3 |
| Formosa | 1 | 1 | 1 |
| India | 17 | 11 | 8 |
| Indonesia | 12 | 12 | 15 |
| Japan | 15 | 15 | 15 |
| New Zealand | 2 | 2 | 2 |
| Pakistan | 4 | 4 | 5 |
| Philippines | 1 | 1 | 3 |
| Timor | 1 | 1 | 1 |
| Total | 64 | 56 | 59 |
| **GRAND TOTAL** | **831** | **816** | **816** |

NOTE: Estimates are made where up-to-date reports are lacking.

# Cities Service buys into chemical firm

CITIES SERVICE has gained a foothold in the common market with acquisition of an interest in the chemical subsidiary of one of Europe's biggest industrial combines.

The move has been made with the cash purchase of a "substantial interest" in Ammoniaque Synthetique et Derives (ASED), which is a principal subsidiary of Evence Coppee.

ASED produces and markets nitrogen fertilizers, coke, and chemicals. Its manufacturing facilities, which are being expanded, are located near Antwerp in the corridor linking the North Sea with heavily industrialized areas of the Ruhr, Luxembourg, Belgium, and northern France.

By acquiring an interest, Cities Service gains an outlet for some of its chemicals in the common-market area through an existing sales organization.

Other Evence Coppee interests include metals, electric power, coal, foods, and construction. Other joint enterprises between Cities Service and Evence in the common market are under consideration.

# Russians, Czechs finish big section of "Friendship" line

RUSSIA and Czechoslovakia have completed a 435-mile section of the Druzhba (Friendship) pipeline, which will carry oil from Second Baku fields to four European satellites.

The finished section of the system, formerly called the Comecon line, includes 250 miles built by Czechoslovakia to the new Slovnaft refinery on the Danube River. Russia has completed a 185-mile section running from Brody southwestward to Uzhgorod, where it connects with the Czech line at the border.

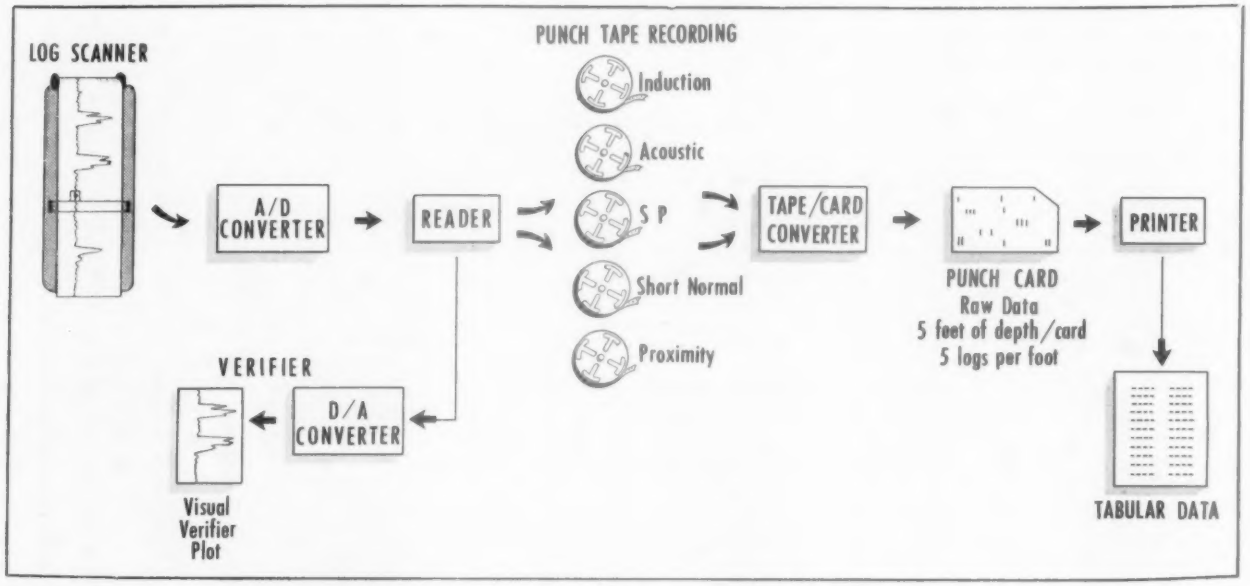
# Union Oil abandons second Aussie test, stakes new wildcat

UNION OIL CO. has plugged its second wildcat in Australia as a dry hole and staked a location for another test.

The operator took the 1 East Cabawin to 12,091 ft. before abandoning the hole. The dry hole is about 4 miles northeast of the 1 Cabawin, a 60-bbl.-a-day find which touched off a wave of exitement when it was completed in May (OGJ, May 8, p. 78). The 1 Cabawin produced 60 bbl. a day for 23 days before being shut in.

The next test, 1 Moonie, will be drilled 18 miles south of the East Cabawin well. Projected depth is 9,000 ft.

# Technology




**HERE ARE THE STEPS** involved in digitizing and collating a well log. Fig. 1.

## New techniques in digitizing and computer analysis now provide a

# universal computer well log

## which gives total interpretation of the entire logged section


BY S. B. BALLEN
Electrical Log Services, Inc., Dallas
R. A. BRODING
Century Geophysical Corp., Tulsa.


LOG ANALYSTS have been championing the view that a foot-by-foot interpretation, or **total interpretation** of suites of logs run on important wells, would provide invaluable subsurface clues that in all probability could result in discoveries which otherwise might be passed up. Because of the overwhelming numbers of observation points required to compute a detailed log, the log analyst has found it impractical from the standpoint of time and expense to pursue total interpretation of logs.

Experienced log analysts freely admit that it is virtually impossible always to detect hydrocarbons by the scanning or "eyeball" method, involving simultaneous consideration of the equation variables, $R_w$, formation-water resistivity, $\phi$, per cent porosity, and $R_t$, true formation resistivity. Many deplore that they often haven't the time adequately to analyze all permeable intervals exposed on suites of logs of some important wells.

Now, by the use of computer techniques, the tedious, detailed calculations can be made quickly and the data, accounting for all three major variables, presented to the log analyst to permit him to pinpoint instantly zones giving evidence of hydrocarbons. He may then analyze these preselected zones critically and in detail. The trained log analyst is thus freed from routine, time-consuming calculations to devote more of his valuable time and judgment to critical evaluation of potential zones highlighted by the computer log and computer-log data.

**Computer-log development.** A de-

velopment project for the computer log was started with the objective of economically digitizing existing or conventional analog recorded logs and computing these log data to give the most meaningful curves to the industry. We found that the cost of digitizing the analog recorded logs was a major bottleneck to full use of logs in a computer process. Therefore, the concept of using central library marketing in combination with semiautomatic digitizing could justify a sharp reduction in the computer-log cost.

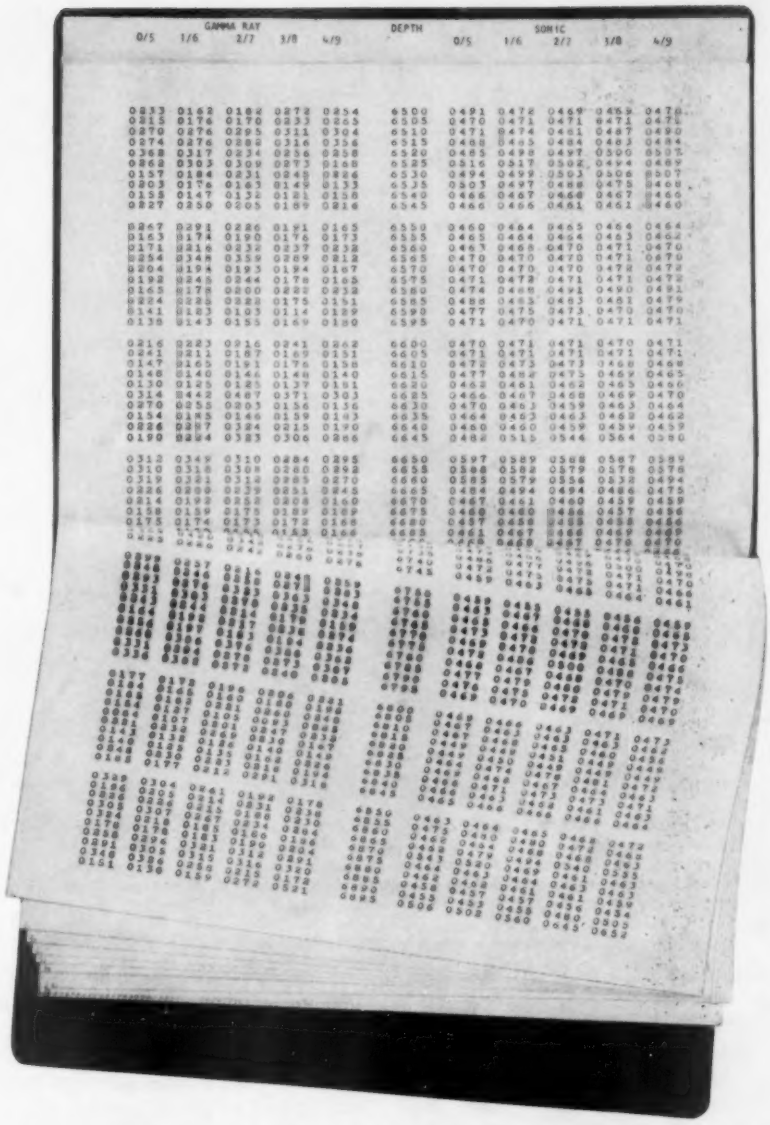
In preparing for the program, an industry-wide survey was conducted to obtain an expression of interest between receiving only digitized records and a completely analyzed log. The response to this survey showed 14% interested in the digitized log, and 32% interested in the computer log; 54% requested both forms of data. The strong interest in both the digitized log data and the computer log directed the program toward furnishing the following:

1. Digitized punch - tape recordings of each curve.
2. IBM cards of the digitized recordings with as many as five separate curves collated to a common depth.
3. Readout booklet of digitized log data.
4. Tabulation of computer - log data.
5. Plotted computer-log data.

In the same industry-wide survey the following tabulation indicates the critical price yardstick for data conversion only, on a 30,000-point basis:

| | |
|---|---|
| (a) Under $30 | 12% |
| (b) $30 - $50 | 27% |
| (c) $50 - $100 | 38% |
| (d) $100 - $200 | 14% |
| (e) Over $200 | 9% |
| | 100% |

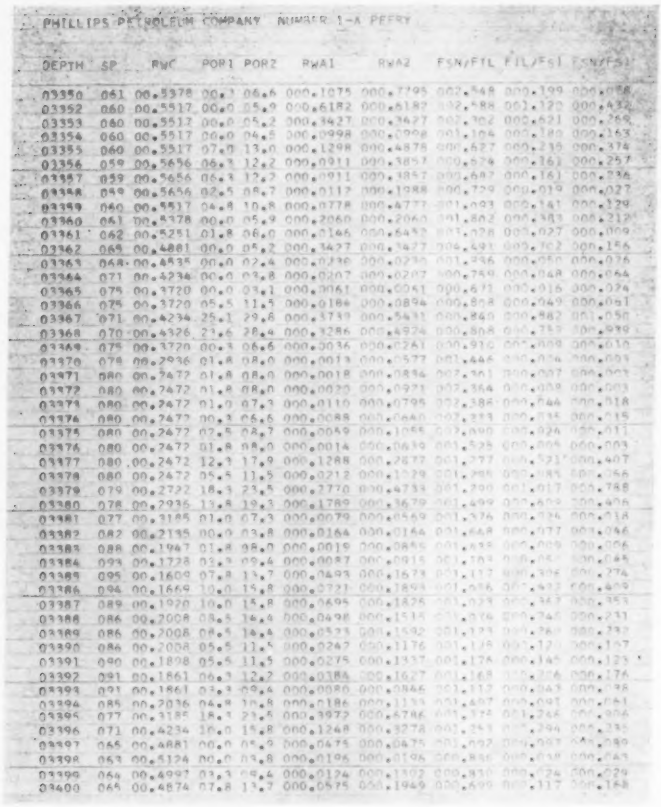
Initially, a geographically diversified group of 20 wells was selected to give a representative sample for applying the process to major areas of interest. After "debugging" the program, the initial group of 20 wells was processed. While the computer log is the end product, the four intermediate products listed above also will be available. It is expected that this material will be offered to the industry by mid-November.




**TABULAR PRINTOUT** of the collated log data is in a readout booklet form. These data are considered as raw data. Fig. 2.

**Digitizing and collating.** As we are presently dealing with analog recorded well logs, the first step in conversion of these data involves curve following to generate an electrical signal identical to the original log. Referring to Fig. 1, this signal is normalized to the scale value of the original log and by an analog - to - digital converter is recorded on paper punch tape in a binary coded decimal form. The normal sample density is one reading per foot of hole depth with an accuracy of three digits. To date no completely automatic curve follower has been devised to take care of scale changes, off-scale recordings, intercrossing of curves, and loss of tracing on rapid excursions. Therefore, since the process is one of manual surveillance and operation, we felt it was necessary to include a verifying or editing procedure of the punch tape. This is done by automatically reading the tape and by a digital-to-analog converter to replot the tape-recorded data so that they can be compared by overlaying the original analog well log.

As each curve is recorded separately, it is convenient to bring the various curves together and collate them at a given depth on a punch



PHILLIPS PETROLEUM COMPANY NUMBER 1-A PERRY

| DEPTH | SP | RWC | POR1 | POR2 | RWA1 | RWA2 | FSN/FIL | FIL/FSI | FSN/FSI |
|---|---|---|---|---|---|---|---|---|---|
| 03350 | 061 | 00.5378 | 00.1 | 06.6 | 000.1075 | 000.7795 | 002.548 | 000.199 | 000.088 |
| 03352 | 060 | 00.5517 | 00.0 | 05.9 | 000.6182 | 000.6182 | 002.588 | 001.120 | 000.432 |
| 03353 | 060 | 00.5517 | 00.0 | 05.2 | 000.3427 | 000.3427 | 002.302 | 000.621 | 000.269 |
| 03354 | 060 | 00.5517 | 00.0 | 04.5 | 000.0998 | 000.0998 | 001.104 | 000.180 | 000.163 |
| 03355 | 060 | 00.5517 | 07.0 | 13.0 | 000.1298 | 000.4878 | 000.627 | 000.235 | 000.374 |
| 03356 | 059 | 00.5656 | 06.3 | 12.2 | 000.0911 | 000.3857 | 000.524 | 000.361 | 000.257 |
| 03357 | 059 | 00.5656 | 06.3 | 12.2 | 000.0911 | 000.3857 | 000.687 | 000.161 | 000.236 |
| 03358 | 059 | 00.5656 | 05.5 | 06.7 | 000.0117 | 000.1988 | 000.729 | 000.019 | 000.027 |
| 03359 | 060 | 00.5517 | 04.8 | 10.8 | 000.0778 | 000.4777 | 001.003 | 000.141 | 000.129 |
| 03360 | 061 | 00.5378 | 00.0 | 05.9 | 000.2060 | 000.2060 | 001.862 | 000.383 | 000.212 |
| 03361 | 062 | 00.5251 | 01.8 | 06.0 | 000.0166 | 000.6452 | 001.078 | 000.027 | 000.009 |
| 03362 | 065 | 00.4881 | 00.0 | 05.2 | 000.3427 | 000.3427 | 000.691 | 000.362 | 000.156 |
| 03363 | 068 | 00.4635 | 00.0 | 02.4 | 000.0230 | 000.0230 | 001.246 | 000.050 | 000.026 |
| 03364 | 071 | 00.4234 | 00.0 | 03.8 | 000.0207 | 000.0207 | 000.749 | 000.048 | 000.064 |
| 03365 | 076 | 00.3720 | 00.0 | 03.1 | 000.0061 | 000.0061 | 000.671 | 000.016 | 000.024 |
| 03366 | 076 | 00.3720 | 05.5 | 11.5 | 000.0186 | 000.0894 | 000.858 | 000.049 | 000.061 |
| 03367 | 071 | 00.4234 | 25.1 | 29.6 | 000.5739 | 000.5431 | 000.840 | 000.882 | 001.050 |
| 03368 | 070 | 00.4326 | 21.6 | 28.4 | 000.3286 | 000.4924 | 000.808 | 000.753 | 000.930 |
| 03369 | 075 | 00.3720 | 00.3 | 06.6 | 000.0036 | 000.0261 | 000.910 | 000.008 | 000.010 |
| 03370 | 078 | 00.2936 | 01.8 | 08.0 | 000.0013 | 000.0577 | 001.446 | 000.036 | 000.025 |
| 03371 | 080 | 00.2472 | 01.8 | 08.0 | 000.0018 | 000.0894 | 002.861 | 000.007 | 000.003 |
| 03372 | 080 | 00.2472 | 01.8 | 08.0 | 000.0020 | 000.0971 | 002.364 | 000.008 | 000.003 |
| 03373 | 080 | 00.2472 | 01.0 | 07.3 | 000.0110 | 000.0795 | 002.386 | 000.046 | 000.018 |
| 03374 | 080 | 00.2472 | 00.3 | 06.6 | 000.0088 | 000.0440 | 002.333 | 000.034 | 000.015 |
| 03375 | 080 | 00.2472 | 02.5 | 08.7 | 000.0049 | 000.1066 | 002.890 | 000.026 | 000.011 |
| 03376 | 080 | 00.2472 | 01.8 | 08.0 | 000.0014 | 000.0630 | 001.528 | 000.006 | 000.003 |
| 03377 | 080 | 00.2472 | 12.3 | 17.9 | 000.1288 | 000.2877 | 001.777 | 000.231 | 000.407 |
| 03378 | 080 | 00.2472 | 05.5 | 11.5 | 000.0212 | 000.1329 | 001.988 | 000.385 | 000.166 |
| 03379 | 079 | 00.2722 | 18.3 | 23.5 | 000.2770 | 000.4733 | 001.700 | 000.517 | 000.748 |
| 03380 | 078 | 00.2936 | 13.8 | 19.3 | 000.1789 | 000.3679 | 001.699 | 000.400 | 000.406 |
| 03381 | 077 | 00.3185 | 01.0 | 07.3 | 000.0079 | 000.0569 | 001.376 | 000.026 | 000.018 |
| 03382 | 082 | 00.2135 | 00.0 | 03.8 | 000.0166 | 000.0166 | 001.868 | 000.177 | 000.046 |
| 03383 | 088 | 00.1947 | 01.8 | 08.0 | 000.0019 | 000.0855 | 001.855 | 000.009 | 000.006 |
| 03384 | 093 | 00.1728 | 01.3 | 09.4 | 000.0087 | 000.0915 | 001.784 | 000.041 | 000.045 |
| 03385 | 095 | 00.1609 | 07.8 | 13.7 | 000.0493 | 000.1673 | 001.117 | 000.206 | 000.274 |
| 03386 | 094 | 00.1669 | 10.0 | 15.8 | 000.2721 | 000.3894 | 001.036 | 000.933 | 000.499 |
| 03387 | 089 | 00.1920 | 10.0 | 15.8 | 000.3694 | 000.3826 | 001.039 | 000.347 | 000.353 |
| 03388 | 086 | 00.2008 | 08.5 | 14.4 | 000.0498 | 000.1514 | 001.376 | 000.240 | 000.231 |
| 03389 | 086 | 00.2008 | 08.5 | 14.4 | 000.0525 | 000.1592 | 001.333 | 000.262 | 000.233 |
| 03390 | 086 | 00.2008 | 05.5 | 11.5 | 000.0247 | 000.1176 | 001.128 | 000.127 | 000.107 |
| 03391 | 090 | 00.1898 | 05.5 | 11.5 | 000.0275 | 000.1337 | 001.178 | 000.145 | 000.123 |
| 03392 | 091 | 00.1861 | 06.3 | 12.2 | 000.0188 | 000.1627 | 001.168 | 000.126 | 000.176 |
| 03393 | 091 | 00.1861 | 03.3 | 09.6 | 000.0080 | 000.0846 | 001.112 | 000.063 | 000.98 |
| 03394 | 085 | 00.2036 | 04.8 | 10.8 | 000.0186 | 000.1133 | 001.407 | 000.091 | 000.061 |
| 03395 | 077 | 00.3185 | 18.3 | 21.5 | 000.3972 | 000.6786 | 001.374 | 000.268 | 000.906 |
| 03396 | 071 | 00.4234 | 16.0 | 19.8 | 000.1268 | 000.3278 | 001.243 | 000.394 | 000.235 |
| 03397 | 065 | 00.4881 | 00.0 | 05.9 | 000.0475 | 000.1902 | 000.887 | 000.087 | 000.040 |
| 03398 | 063 | 00.5124 | 00.0 | 03.8 | 000.0196 | 000.0196 | 000.886 | 000.018 | 000.043 |
| 03399 | 064 | 00.4997 | 03.3 | 09.6 | 000.0124 | 000.1302 | 000.830 | 000.024 | 000.029 |
| 03400 | 065 | 00.4874 | 07.8 | 13.7 | 000.0575 | 000.1949 | 000.899 | 000.117 | 000.188 |

**COMPUTER TYPEOUT** is obtained after the raw-data punch cards are processed by an IBM 1620 computer. Necessary control data (mud resistivity, borehole temperature, depth offset between curves, etc.) are also processed. The computer produces both a tabular typeout and a computed data punch card. Fig. 3.

card. Typically, five separate logs are used in the computer-log program.

A tabular printout of the collated log data is available in a readout booklet form for the trained log analyst who chooses to perform individual special calculations. These data are considered as raw data since they represent a direct conversion of the analog recorded logs to digital form with no depth offsets, interpretation, scale corrections, etc., (Fig. 2).

In the future we can expect that many of the above steps can be eliminated by direct digital recording in the field. However, it will be some time before a composite tool is developed to record simultaneously the five basic curves in digital form to give the equivalent of the collated raw-data card.

**Computing and plotting.** The raw-data punch cards are processed by an IBM 1620 computer along with the necessary control data such as mud resistivity, borehole temperature, depth offset betwen curves, etc. The output of the computer is in the form of both a tabular typeout (Fig. 3) and a computed-data punch card. The data punch cards are then read and plotted to give a graphic representation similar to an analog recorded log (Fig. 4). A schematic chart of this operation is shown in Fig. 5.

## Log Format

In developing the format for the computer log, four basic output curves were considered to be of prime importance:

**1. Correlation curve.** It is believed that the general presentation of a computer log should follow the format of the conventional analog-type logs. Therefore, a curve should be included that allows correlation of the computer logs to lithology or conventional logs or both. For this purpose the self-potential curve was chosen. Where such a curve is not available, the gamma-ray log is used. This curve is plotted in the first track of the computer log.

**2. Porosity curve.** A porosity curve can be computed from several log types. For the computer log, an acoustical log-derived porosity is preferred because such a curve is less affected by variable flushing, in contrast to the effect these variables may have on porosity calculations from microresistivity devices[1]. The time-average formula of Wyllie[2] is used, i.e.,

$$\phi = \frac{\Delta t_1 - \Delta t_m}{\Delta t_f - \Delta t_m}$$

Where:

$\phi$ = computed porosity

$\Delta t_1$ = log measured interval transit time $\mu$ sec./ft.

$\Delta t_m$ = rock matrix transient time $\mu$ sec./ft.

$\Delta t_f$ = formation fluid transient time $\mu$ sec./ft.

Matrix velocities appropriate to local conditions and lithology are employed. For mixed lithologies values of 18,000 ft. per second for average sandstones and 21,500 ft. per second for more compact formations, with an average fluid velocity of 5,300 ft. per second, are used. However, these may be varied for conditions of depth, compaction, velocity changes, and experience. Two calibrated porosity curves are thus presented, permitting interpolation of lithologic variations. The porosity curves are plotted on the second track, per cent porosity increasing to the left for ready correlation with resistivity, neutron, and other curves that respond to porosity changes.

**3. Discriminator curve.** The discriminator curve is so named because it permits ready distinction between hydrocarbon and water-bearing sections by simple, visual comparison of relatively high and low values. It is simply a plot of:

$R_{wa} = R_t/F$ (oil and gas); $R_w = R_o/F$ (water sands)

Where:

$R_{wa}$ = apparent water resistivity

$R_w$ = true water resistivity

$R_t$ = true formation resistivity

$R_o$ = Resistivity 100% water saturated formation

F = formation-resistivity factor

The value of $R_t$ is generally de-

rived from focused resistivity curves, preferably induction and properly selected Laterologs. The formation resistivity factor, F, is derived from an acoustic log ($F_a$). The discriminator curve is a foot-by-foot plot of $R_{wa}$, and is an expression of the technique originally described by Tixier[3], et al.

A reference line for $R_w$, formation-water resistivity, is established from water catalogs, water samples, reliable estimates from the SP equation or, in water-saturated formations, from the low values of the discriminator curve itself. $R_{wa}$ values greater than the reference $R_w$ value indicate presence of hydrocarbons. When $F_a$ and $R_t$ are the correct formation-resistivity factor and true resistivity, respectively, the discriminator curve permits a quantitative evaluation of water saturation by:

$$S_w\% = (R_w/R_{wa})^{1/2}$$

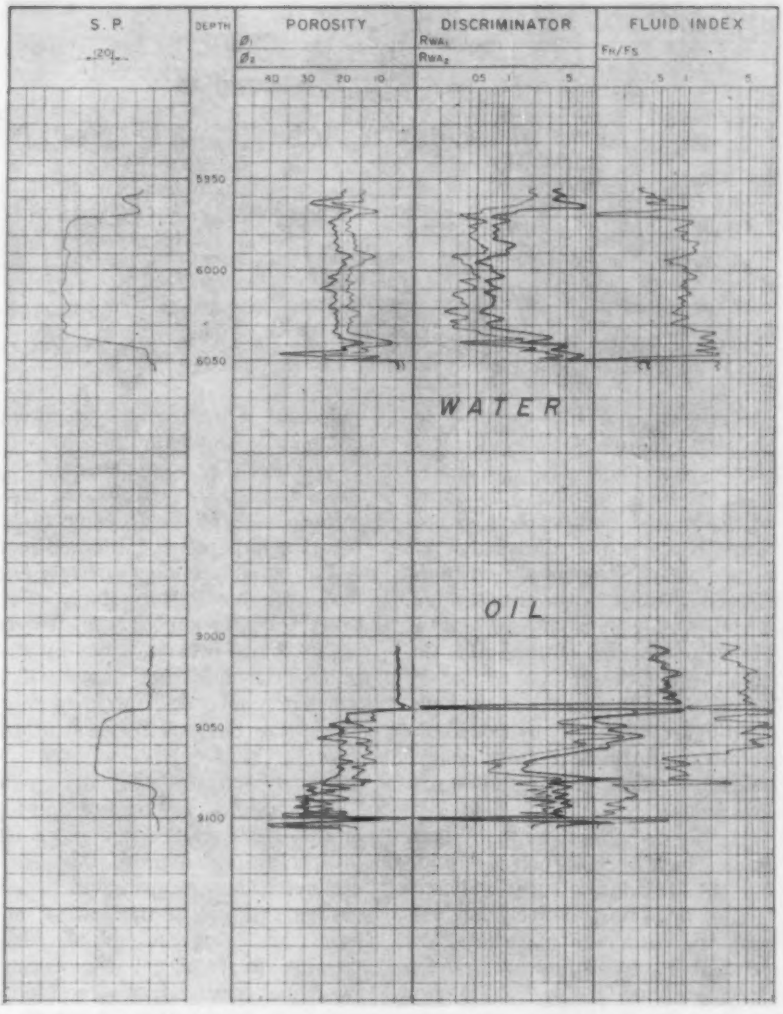
Thus, if $R_{wa}$ is four times $R_w$, the water saturation is 50%.

Similar comparisons give semi-quantitative estimates of water saturations when F and $R_t$ are less exact. Nevertheless, comparison of high and low $R_{wa}$ values highlights hydrocarbon saturations.

The discriminator curve is particularly useful for $R_w$ determination in fresh and brackish waters, in thin-bedded and shaly formations, and for unique invasion conditions where the SP equation cannot safely be used for this purpose.

Thus, the discriminator curve not only distinguishes between water and hydrocarbon-bearing sections but also may be invaluable for the determination of $R_w$, a parameter fundamental to accurate quantitative log interpretation. The scaled discriminator curve is plotted on the third track of the computer log, $R_{wa}$ and hydrocarbon saturations increasing to the right analogously to resistivity increase with increasing hydrocarbon saturation of conventional logs.

**4. Fluid index curve.** A curve of $F_r/F_a$ or $F_r/F_r'$ is plotted on the fourth track and expresses a ratio of an apparent formation-resistivity factor, $F_r$, from a shallow investigating resistivity curve either to a true-formation-resistivity factor, $F_a$, from an acoustic log, or to another apparent formation-resistivity factor, $F_r'$, from a deeper investigating resistivity curve. It is labeled a fluid index curve because it quantitatively expresses $S_w\%$ for certain ideal $F_r/F_a$ plots and it qualitatively expresses the extent of invasion and flushing which is related to the presence or absence of formation permeability to filtrate waters.

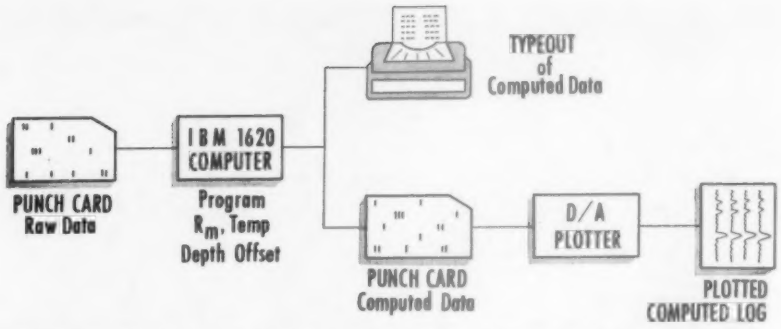



**GRAPHIC PRESENTATION** of the computed data punch cards results in a log plot by the computer. Fig. 4.

Tixier[3], et al., first published an elucidation of the principles underlying the $F_r/F_a$ technique and nomographic charts subsequently appeared in the Schlumberger Log Interpretation Charts.

Another development of the $F_a/F_a'$ or $F_r/F_r'$ concept, whereby comparisons of apparent formation-resistivity factors derived from shallow and deeper resistivity device logs are used for hydrocarbon detection, has been used and described by Hamilton[1 4 6 7 8] in lectures and advanced log-interpretation schools for 3 years. Analog computer plots of $F_a$ data derived from proximity logs, the Laterolog 8, induction logs, and short normal curves have been superimposed over F plots derived from acoustic logs, on charts having common formation-factor scales, permitting instant $F_a$ vs. $F_a'$ and $F_r$ vs. $F_r'$ vs. F comparisons. The significance of "separation" between curves and the technique of interpretation has been described by Hamilton and Broding[4 5 7 9] in numerous lectures during the past 2 years. These early analog-comparison plots are now replaced by $F_r/F_a$ and $F_r/F_r'$ ratio computed plots of the computer log, and recently we have adopted the nomenclature of Tixier.

In interpreting the fluid index curve, values of $F_r/F_a$ greater than one, in the ideal case, indicate hy-




**SCHEMATIC CHART** shows the steps from raw-data punch card to the plotted log. This is the computing and plotting phase of the technique. Fig. 5.

drocarbons, and the curve quantitatively expresses $S_w\%$. In less-ideal cases the $F_r/F_a$ and $F_r/F_r'$ plots are semiquantitative indicators of water and hydrocarbon saturations. Unity is not always the reference value, particularly when $F_r$ is derived from longer spacings and when flushing is incomplete, and the exact quantitative interpretation depends upon the source of the $F_r$ value. Nevertheless, relatively high-fluid-index values in hydrocarbons permit a distinction from water-bearing sections having relatively low values.

If the discriminator curve indicates a high hydrocarbon saturation but the fluid-index curve indicates lack of invasion (relatively low values), the formation may have low permeabilty to filtrate water. On the other hand, if the discriminator curve indicates high hydrocarbon saturations and the fluid index curve indicates flushing and invasion (relatively high values), the bed is permeable to filtrate waters. Therefore, comparison of the fluid index and discriminator curves provides a qualitative evaluation of the presence or absence of permeability to filtrate.

Thus, the suite of four curves offers the log analyst a detailed top-to-bottom presentation of the fundamental computations necessary for his refined interpretive techniques. It also offers a guide to zones of interest, as it quickly indicates:

1. Permeable zones.
2. Porosity evaluations.
3. Discrimination between water and hydrocarbons.
4. Quantitative evaluation of water saturations.
5. Qualitative studies of permeability and movable oil.

This information from adequate logs, combined with experience and judgment of the log analyst, should completely eliminate "overlooked" production. The computer data permit a detailed log analysis that heretofore was physically impossible from the standpoint of time and cost.

For the independent operator and the exploration geologist the computer log will expedite oil-searching programs because it readily pinpoints all hydrocarbon shows, which zones may then be referred to competent log analysts for critical review.

**Conclusions.** The trained well-log analyst has carved out a place for his profession alongside other disciplines endeavoring to find hydrocarbon reserves at the lowest unit cost. He brings to the problem training in electrical engineering, mathematics, stratigraphy, and judgment. It would seem shortsighted not to have the full contribution of computer logs as they add only an incremental cost to a basic logging program. The computer is a practical means of permitting the log analyst to obtain maximum value from a log since it frees him from the monotony of a multitude of routine calculations and allows him to utilize his skill and experience for concentrated evaluation of anomalies highspotted by a computer log. For example, the computed log as presented represents 38,000 mathematical computations per 1,000 ft. of hole. Unquestionably, the techniques now being employed in extracting the maximum information from well logs will become even more sophisticated as experience increases.

While we do not yet have sufficient knowledge of market demand to know the precise prices required to support a digitizing-computing program, this test project has clearly demonstrated that prices can be reduced. With enough interest to maintain a digitizing-computer program on a routine basis in much the same way as oil reporting, elevation, abstract, etc., services have been accepted by the oil industry, it would be possible for prices to be established which will fall within the reach of the majority of operators.

It is certain that the log of the future will include a computer-type log. Field instrumentation must be directed towards collecting the log information on a recording medium such as digital magnetic tape and in a format compatible with the input requirements of computers. To further this objective and to take advantage of present and past logs, the procedure as outlined has permitted making a computer log available to the industry. This effort is under the joint sponsorship of Century Geophysical Corp. and Electrical Log Services, Inc., in cooperation with the interpretive and technical guidance of Dr. R. G. Hamilton and Dr. F. L. Cash.

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BY W. L. NELSON, Technical Editor and Petroleum Consultant



103.

# Operating cost depends on process

HERETOFORE the refinery operating costs stated in the Process Costimating series have been based primarily on the purchases of fuel, labor, electricity, chemicals, etc., of average refineries. Process Costimating No. 5 (March 24, 1958, p. 211) summarized such costs since 1926 for average refineries, and the cost of fuel was discussed in issues No. 4 (March 17, 1958, p. 190) and No. 75 (July 11, 1960, p. 105), electrical power No. 13 and 14 (May 19, p. 181, and May 26, p. 114, 1958), labor and wages in No. 41 (Feb. 16, 1959, p. 163), tetraethyl lead No. 68 (March 21, 1960, p. 127), chemicals and their cost No. 70 (April 25, 1960, p. 210), and maintenance materials No. 77 (Aug. 15, 1960, p. 173).

It was originally necessary to follow such a method because scarcely any statistics were available except totals or averages for the entire industry such as total fuel consumed, total workmen, average TEL per gallon, etc. This is a good and sound method but it fails to introduce the very large differences that are encountered among actual refineries.

Finally, however, enough data have been accumulated and adequate methods of correlation have been developed for the presentation of refinery operating costs in terms of the processes conducted in a refinery. Table 1 shows direct and total operating costs for the many processes conducted in the average U. S. refinery during the (base) year 1956.

The unit operating costs are taken from the numerous issues of Process Costimating which pertain to the operating costs of processes. There is no need to consider steam or power-generation costs because such costs are already included in the operating costs of each of the processes.

Each process operation also involves certain overhead costs such as the items shown after the first subtotal of Table 1. These have been examined in detail in numerous Process Costimating issues—Royalties in Process Costimating No. 7 (April 7, 1958, p. 170) and many studies of improvement and obsolescence costs such as those in the Process Costimating installments Nos. 76, 88, 90, 92, 97, 99, and 100.

Finally, the administrative and other costs shown at the end of Table 1 are an approximation based upon the number of employes used for each of the functions. Process Costimating No. 48, Refinery Personnel by Departments, May 11, 1959, p. 115, was used in judging the number of employes and the cost of such functions.

**Table 1—Approximate operating cost of average 1956 refinery, cents per barrel, in terms of process operations**

| | Processing, bbl. per 100 bbl. crude | Unit cost per bbl. feed | | Per bbl. crude oil | | Refer to Proc. Cost. No. |
|---|---|---|---|---|---|---|
| | | Direct | Total | Direct | Total | |
| Pipe still topping | 100 | 8.3 | * 9.7 | 8.30 | 9.70 | 27 |
| Crude desalting | 95 | 1.3 | * 1.5 | 1.24 | 1.42 | 43 |
| Vacuum distillation | 5 | 21.0 | *26.2 | 1.05 | 1.31 | 35 |
| Vacuum flashing | 21.6 | 12.0 | *15.3 | 2.59 | 3.30 | 39 |
| Thermal cracking | 11 | 36.2 | *44.3 | 3.87 | 4.87 | 47 |
| Thermal reforming | 4 | 14.5 | *18.9 | 0.58 | 0.76 | 45 |
| Thermal coking | 4.7 | 29.0 | *38.8 | 1.36 | 1.82 | 52 |
| Thermal viscosity breaking | 7.4 | 11.6 | *15.8 | 0.55 | 1.17 | 67 |
| Catalytic cracking | 41.4 | 24.5 | *40.0 | 10.10 | 16.50 | 65 |
| Catalytic reforming | 10.3 | 36.0 | *53.0 | 3.71 | 5.45 | 56 |
| Asphalt manufacture | 6.0 | 25.0 | 35.0 | 1.50 | 2.10 | †120 |
| Polymerization | 1.6 | 36.0 | *70.0 | 0.57 | 1.12 | 61 |
| Alkylation | 2.8 | 93.0 | *135.0 | 2.60 | 3.78 | 69 |
| Hydrodesulfurization | 4.8 | 15.0 | *21.0 | 0.72 | 1.01 | 73 |
| Gasoline—all treating and blending | 43.4 | 4.5 | 5.0 | 1.95 | 2.17 | 95 |
| Gasoline additives | 43.4 | 1.9 | 1.9 | 0.82 | 0.82 | 81 |
| Tetraethyl lead | 43.4 | 22.7 | 22.7 | 9.85 | 9.85 | 70 |
| Light oil (others) treating | 6 | 6.0 | 6.5 | 0.36 | 0.39 | 98 |
| Lube—solvent extraction | 4 | 35.0 | *54.0 | 1.40 | 2.16 | 96 |
| Lube—dewaxing and deoiling | 1.8 | 50.0 | 70.0 | 0.90 | 1.26 | 102, †111 |
| Lube—rerunning | 4 | 12.0 | 17.0 | 0.48 | 0.68 | 93 |
| Lube—decolorizing | 2 | 40.0 | 50.0 | 0.80 | 1.00 | †107, †113 |
| Lube—additives (lube and wax) | 2 | 376.0 | 376.0 | 7.52 | 7.52 | †117, †124 |
| First subtotal | .... | .... | .... | 62.82 | 80.16 | .... |
| Insurance and taxes | .... | .... | .... | 3.80 | ‡2.08 | .... |
| Royalties | .... | .... | .... | 3.20 | ‡1.76 | .... |
| Obsolescence and improvements | .... | .... | .... | 16.20 | ‡8.88 | .... |
| Interest on investment | .... | .... | .... | 10.30 | ‡5.70 | .... |
| Laboratory | .... | .... | .... | ‡5.00 | ‡2.74 | .... |
| Second subtotal | .... | .... | .... | 101.32 | 101.32 | .... |
| Administrative (2.3% of subtotal)‡ | .... | .... | .... | ‡2.6 | ‡2.6 | .... |
| Technical services (2.3% of subtotal)‡ | .... | .... | .... | ‡2.5 | ‡2.5 | .... |
| Pumphouse (2.3% of subtotal)‡ | .... | .... | .... | ‡2.5 | ‡2.5 | .... |
| Shipping (5.4% of subtotal)‡ | .... | .... | .... | ‡6.0 | ‡6.0 | .... |
| Custodial (3.7% of subtotale)‡ | .... | .... | .... | ‡4.1 | ‡4.1 | .... |
| Total | .... | .... | .... | 119.02 | 119.02 | .... |

*10% allowed for costs based on investment, rather than 7% and only part of rayalty cost charged.
†Not yet published.
‡Introduced as an approximation to arrive at totals. Not yet investigated in Process Costimating Series.

**Extreme cold, high winds make oil handling in Argentina's Comodoro Rivadavia area difficult. This close to Little America, where there are few towns and practically no roads, normally heavy crude becomes more viscous. But there is some hope for relief as . . .**

# Automation licks Argentine production problems

**BY ED McGHEE,**
Drilling Editor

YACIMIENTOS Petroliferos Fiscales of Argentina is installing an ultramodern oil - production system in that nation's gigantic Comodoro Rivadavia field. The new system will make oil handling more efficient and less expensive by designing to overcome three perplexing problems:

**1. Remote location.** Since there are few sizable towns or improved roads in the area, transporting and housing pumpers is quite expensive.

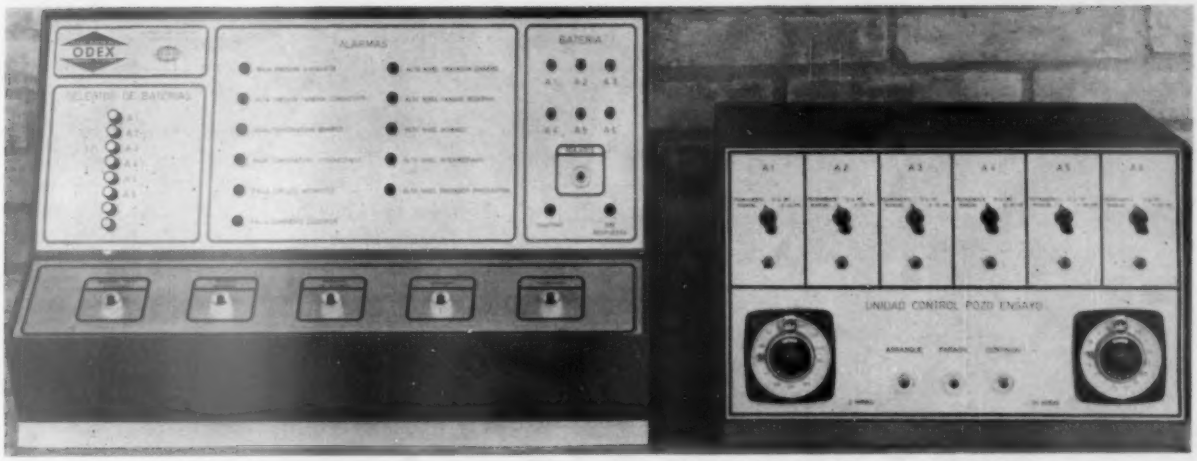
**2. Weather extremes. Below-freezing** temperatures are the rule much of the year. Sustained winds of 100 m.p.h. are common.

**3. High - viscosity crude.** Barely pumpable at normal temperatures, the crude can solidify completely if allowed to sit in cold weather.

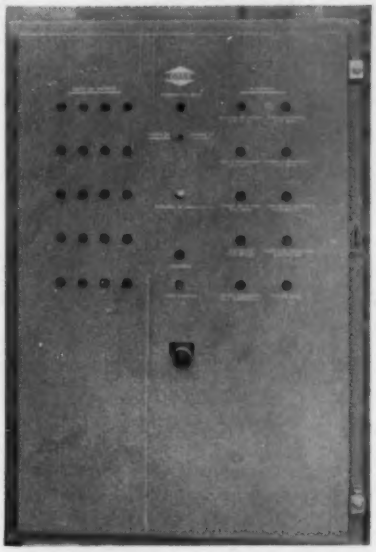
The six tank batteries in YPF's project include the following equipment to overcome the above problems:

**1. Automatic well testing.** Every well will be automatically and remotely tested on a regular routine. Or, any given well can be tested automatically at any given time. As a result, no special trip need be made to the field by engineers or pumpers.

**LACT UNITS** lined up for shipment to Argentina. One of these will be located at each of six tank batteries in YPF's automation project.




**DISPLAY PANELS AT CENTRAL OFFICE** show status and give alarms from operations at the remote tank batteries. Well testing is automatically rotated from one well to next. But cycle can be interrupted to test any given well. This panel shows which well is on test, and what is going to happen next, while . . .



. . . this panel at the tank battery shows the condition of equipment there. Similar panels are installed at five other batteries within 5-mile radius. Alarm lights show abnormal operating conditions.

**2. LACT units at each battery.** Oil is not allowed to accumulate at the tank batteries; instead, it pumps out to pipeline automatically and continuously with only a minimum of tank time. Not only is pumper labor saved, but also the oil has no chance to become cold and to congeal.

**3. Double-firebox heaters.** The production three-phase separating heater-treaters are equipped with two fireboxes so that temperature can be raised high enough to cut pumping pressures, break out entrained water, and prevent solidification of the oil.

**4. Screw-type pipeline pumps.** Since piston-type pumps had difficulty handling the thick fluids, 150-hp. screw-type pumps are used to move the crude from the LACT units into the pipeline.

**5. Remote supervision and control.** No operators are required for routine work in the field. Supervision of the field and control of the batteries comes from a central electronic system in an office approximately 40 miles distant.

To make these things possible, the supervisory-control system has these features:

**1. Three-way-valve control.** The three-way, two-position valves on the flow header at each battery can be controlled to put any well on test or into the regular production stream.

**2. Status indication.** After the control instructs any valve to operate, it gets a back indication of whether the valve complied.

**3. Alarm signaling.** Warnings flash at the central control for any number of unusual conditions in the field such as high fluid level in tanks or separators.

**4. Record of changes, tests.** Status changes made in wells and other equipment are automatically recorded at the central control along with time and date of the change. Test information is also recorded automatically.

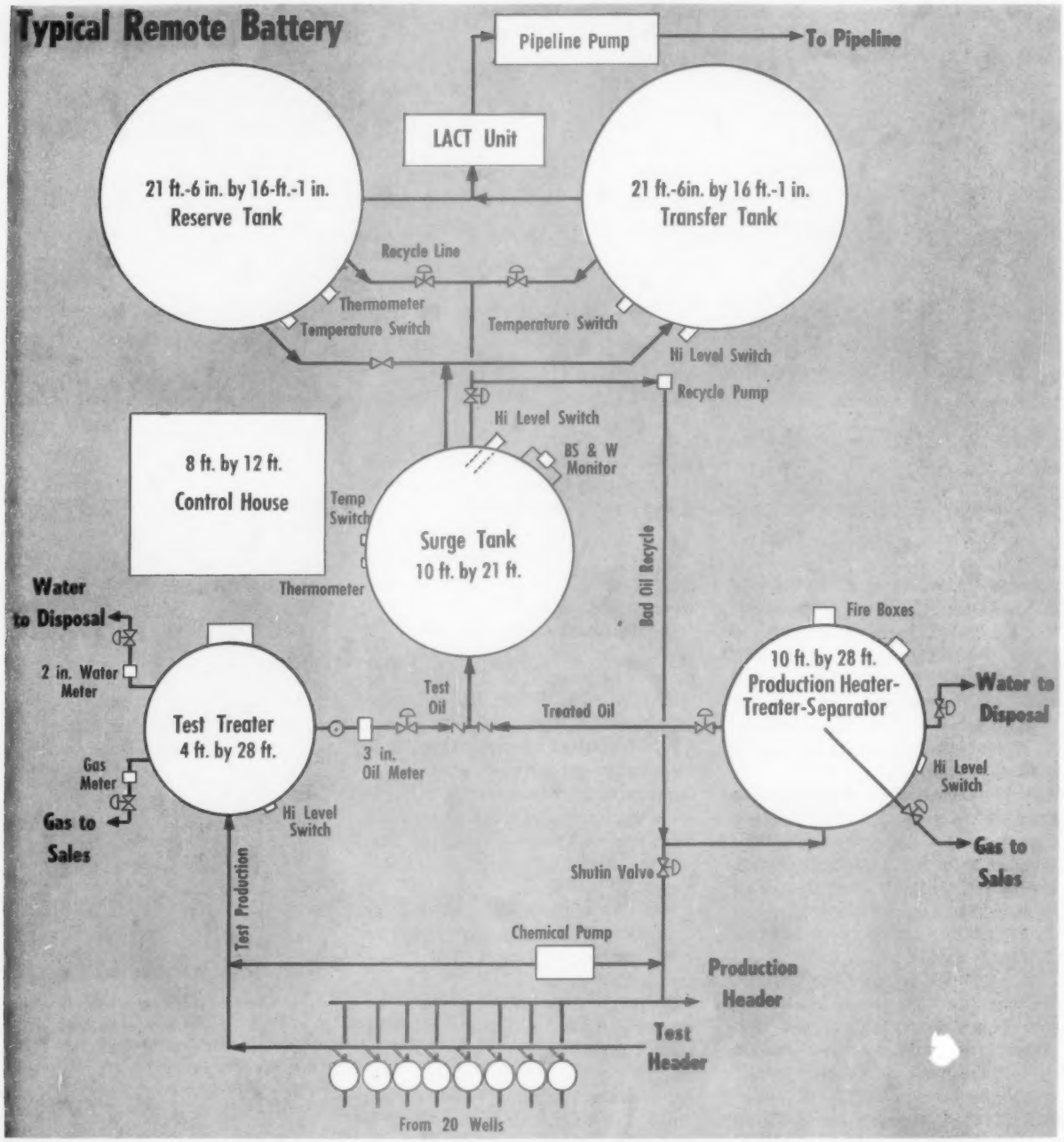
The system being installed at Comodoro Rivadavia was designed by Odex Engineering Co. of Houston and Odessa, Tex. In the history on supervisory-control systems for oil production, this one has at least two distinctions:

1. It is one of the first to use solid-state electronic components. Instead of relays and vacuum tubes, diodes and transistors are used throughout. Result should be improved reliability.

2. It is the first, and perhaps the only, system to operate on 50-c.p.s. alternating current. Previous systems have been in areas where 60-cycle current is standard and off-the-shelf equipment can be used. The 50-c.p.s. equipment is all specially made.

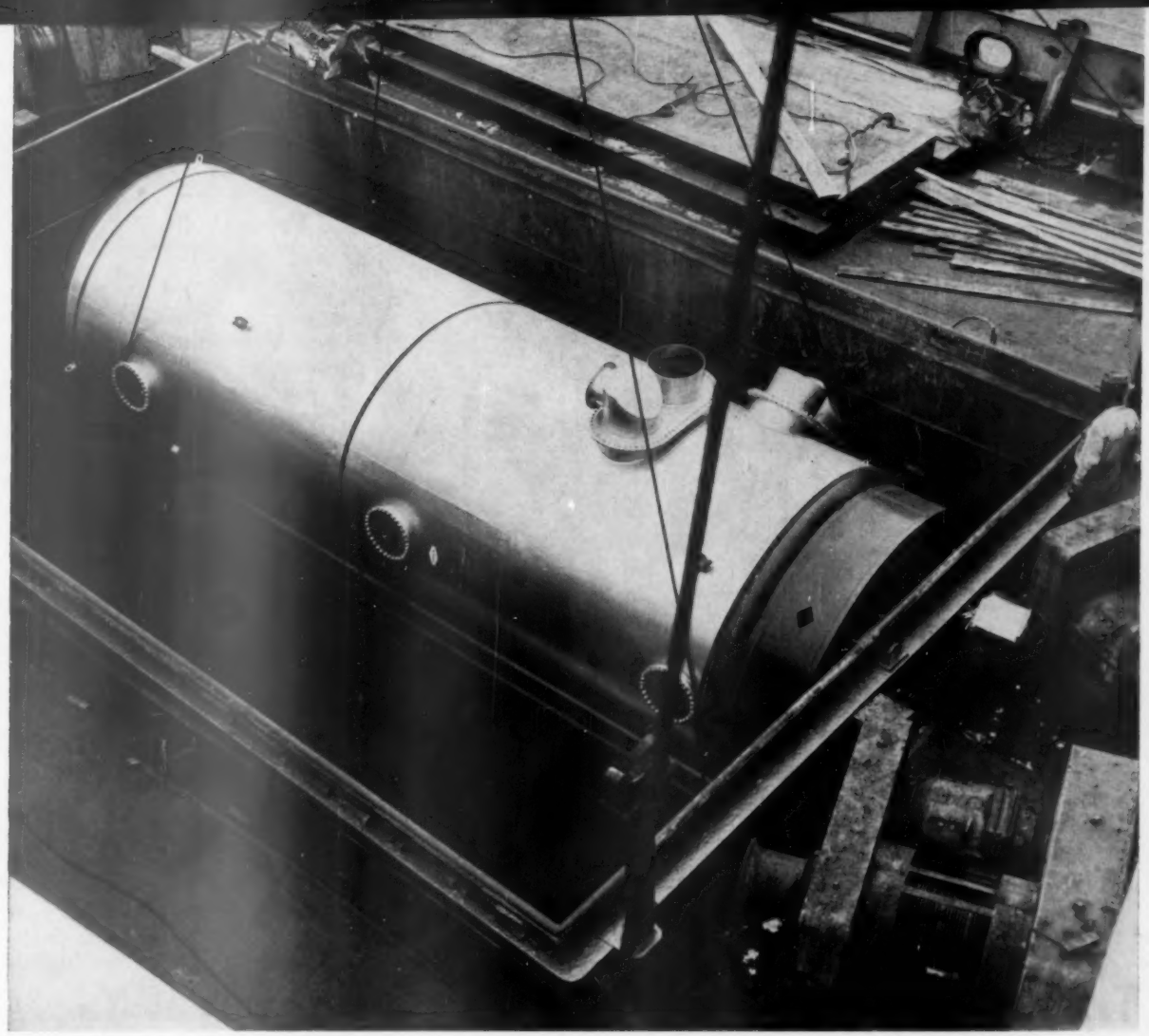
**Twenty wells per battery.** The YPF project is approximately 150 miles inland from Puerto Deseado, Argentina. Involved are a group of 120 Comodoro Rivadavia wells, divided into groups of 20 and flowing into six separate tank batteries. Many of the wells are being beam-pumped and individual well-control programing is not included although means are provided for shutting in each well in event hazards exist. The six batteries are in a radius of about 5 miles of each other but the monitoring and control point is some 40 miles away in an office.

The crude oil normally has a viscosity in the range of 300 to 400 S.s.U. However, because of the extreme cold in winter (often —40° F.), design of the pumping equip-




**EACH OF THE SIX TANK BATTERIES** is laid out in this fashion. There is no need for a pumper or gager to perform routine duties at these batteries since control and supervision come from a central office 40 miles away.

**HAND-WOUND ELECTRIC MOTORS** for 50-cycle current, and screw-type pumps are needed to handle viscous crude. Elsewhere lower viscosities and standard 60-cycle current would make this special equipment unnecessary.



**DOUBLE-FIREBOX HEATER-TREATER** is being loaded into freighter for long trip to the Argentine. Cold weather in the shadow of the South Pole makes a single-firebox treater inadequate.

ment is based on viscosity of 1,000 S.s.U. The three-phase heater-treaters have two fireboxes so that they can put a maximum of 2,500 M. B.t.u. per hour into the production stream.

The test treater handles much less oil and requires only the usual single firebox.

All the tanks have temperature switches which start recycling pumps in case temperature of the oil drops below its safety range. Also, the treated-oil surge tank has a bypass b.s. and w. monitor which continuously records the water content of the crude.

Oil is pumped from the battery through a positive-displacement-meter type of LACT unit. The unit works off level switches in a large transfer tank.

**Supervision, control points.** Primary control point at the batteries is the flow-line header. Each well flow line coming into the header has its own three-way, two-position valve. Signals from the remote controller rotate the testing of each well in turn, then returning the well to the regular production stream. This testing program can be interrupted to test any particular well out of sequence.

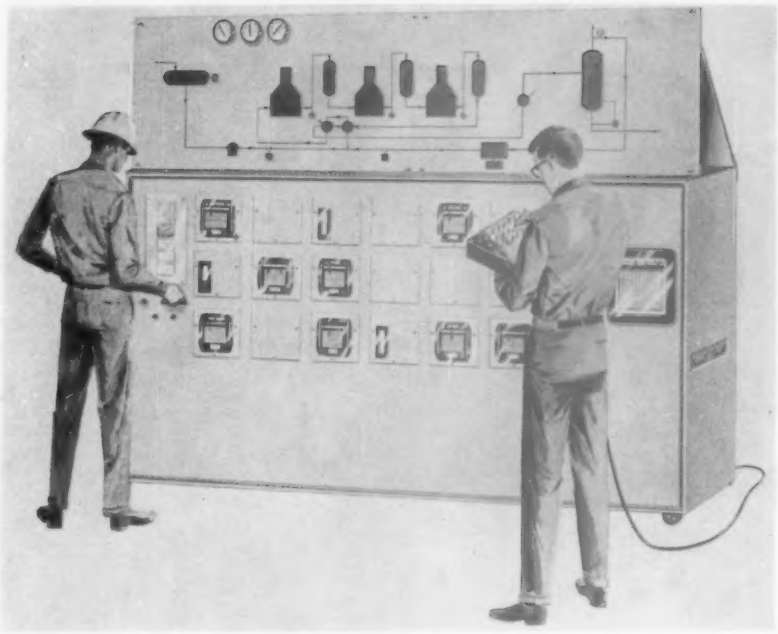
In addition to these control points, the central system monitors these points:

1. Position of the three-way valves.
2. Oil, water, and gas-meter readings on the test treater.
3. High-level switches in the treaters and tanks.
4. Temperature switches in treaters and tanks.
5. Meter reading on the LACT units.
6. Gas-meter reading of total gas produced.

If usual power is lost between the batteries and the central control, most essential functions continue with current from storage batteries. The battery equipment itself does not shut in on power failure. Instead, it continues to function until storage is filled up. At that time, a valve in the incoming oil line shuts in.

A power failure is indicated immediately at the central control. Then, whatever repairs are necessary can be made with a minimum of lost time.

Information and control signals pass from the central office to the field batteries in the form of positive and negative coded pulses carried on telephone wires. Information received at the monitoring office is also stored on punched paper tape. This tape can then be used to transmit production information to Buenos Aires.



**NEW DEVICE** which will simulate most process-control systems helps . . .

# Trainees practice on "canned" process-control setups

A NEW training aid has been developed which will simulate nearly any process-control system. Setups once made can easily be "canned" and may be reproduced any time within a reasonable period.

It differs from the type that has been used by many companies in that it will handle almost any process. Older facsimiles had to be custom built to match the control system of each individual installation. The versatile new trainer largely eliminates this necessity.

The two-panel trainer is shown in the accompanying artist's sketch. The lower panel contains 22 stations for plug-in, electrically operated and controlled simulated instruments; six visual and audio alarm stations, and various control switches. Sets of interchangeable charts and scales are provided for each instrument. Plexiglass faces over the instruments and alarms allow the instructor to key each instrument station to the flow diagram.

The upper panel has a light green magnetic ceramic surface. The instructor draws the proper flow diagram on the surface with a grease pencil. He then programs the electronic action for the instruments on the bottom panel.

The rear of the panel contains the actuating electrical and mechanical mechanisms. It also contains a patchboard for programing the electronic action by means of jumper wires. With 220 contact points and 150 jumper wires the possible combinations are almost infinite.

Interlocking controls may also be programed: An indication of rising temperature on one instrument will automatically bring about a rise in pressure in another. Patchboards which are set up for given simulations may be removed intact (jumper wires in place) and stored for future use.

To control the trainer, the instructor uses a remote-control console connected by an extension cord into the trainer. With the console he can manipulate any instrument or alarm to simulate the dynamics of the process. The trainee then takes the appropriate control steps by adjusting the instruments on the face of the trainer.

The trainer weighs 350 lb. and can be folded into an 8 by 4½ by 1⅓-ft. package.

Specialized simulator panels similar to this one have been used by several refiners and chemical plants to ease their startup pains.

Du Pont Co. has used a process trainer which duplicated the control room of a new plant which the firm built.

Standard Oil Co. (Ohio) has used a 14-ft. control panel which duplicated the control room of a 60,000-bbl. fluid catalytic cracker.

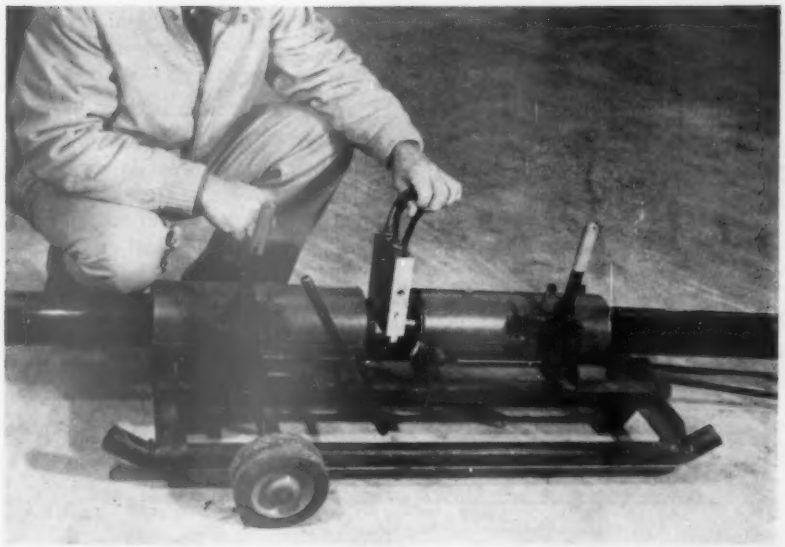
Mobil Oil Co. uses a set of specialized component trainers, such as valve, centrifugal pump, shell-and-tube heat exchanger, air-cooled exchanger, oil and gas burner, centrifugal recycle gas compressor, systems controller, heater trainers, and instrument trainers.

The equipment is manufactured by Carmody Corp., Buffalo, N. Y.

# Plastic line pipe may be standard within 5 years, Phillips says

HIGH - DENSITY polyethylene pipe may be standard for gas-gathering lines within 5 years. That's the word from Phillips Petroleum Co. which based the prediction on its own 6-year experience with 2 million feet of the pipe in oil and gas fields.

Phillips anticipates that industry pipe sales will account for over 16 million pounds of high-density polyethylene in 1961, about 7% of the



**BUTT-FUSION PROCESS** joins polyethylene pipe quickly, simply, and efficiently. Only precautions: pipe ends must be clean and smooth, and heating-plate temperature must be about 400° F.

estimated 233 million pounds that will be consumed this year.

Factors which convinced Phillips to adopt high-density polyethylene for its gas-gathering lines were these:

**New method** of joining (butt fusion) reducing joining time to 30 seconds.

**Savings.** Butt-fusion joint costs less than one-third as much as a comparable welded steel joint. Polyethylene also costs less to install and eliminates the need for corrosion protection.

**Maintenance.** After 50,000 joinings, routine pressure testing showed only 10 joints had been improperly made. There have been no failures in the line itself.

**Lightweight.** The new pipe weighs only 46 lb. compared to 368 lb. for an identical length and diameter of steel pipe.

**Impact strength** exceeds requirements for field handling even at temperatures below zero.

**Inside wall smoothness.** High-density resins produce highly slick inside pipe walls. This materially reduces friction and cuts back on scale buildup.

The butt-fusion technique is relatively simple. The pipe ends (which can be cut with a handsaw) are squared off and placed in lineup clamps so that they face each other. An aluminum plate, heated to about 400° F., is inserted between the two ends.

After about 30 seconds exposure to the heated plate, the pipe ends soften. The heated plate is removed and the two molten pipe ends are pressed together. After about 20 seconds' cooling time the joint is completed and the joined pipe is ready for the ditch.

# Mobil is adding crude storage at Los Angeles

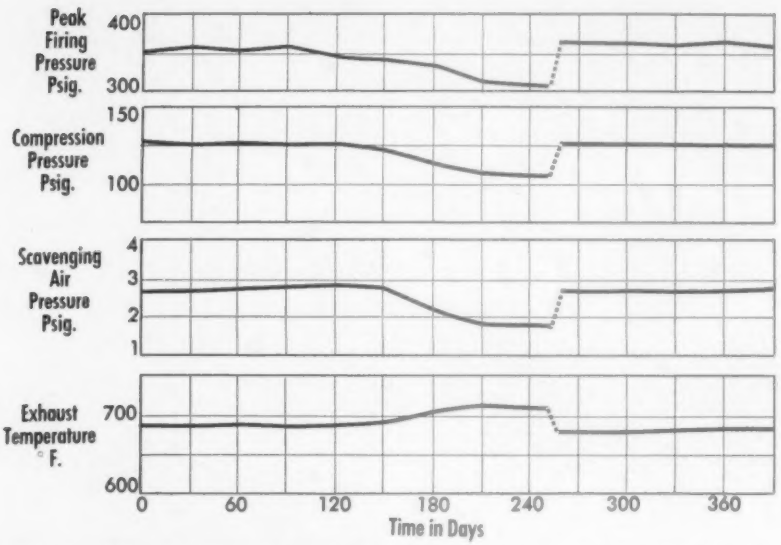
MOBIL OIL CO. will expand its crude-oil-storage capacity in the Los Angeles Harbor to more than a million barrels.

The company has picked a site (outlined in photo) a mile northeast of the present crude and product storage tanks. The new tankage will total 875,000 bbl. Part of the present 320,000 bbl. of crude storage will be converted to product service once the five new tanks are completed.

The channel leading up to the terminal also will be deepened to 51 ft. as part of the expansion. The deeper channel will permit Mobil to handle tankers as large as a 92,750-ton tanker under construction for an affiliate in Sweden. The terminal's discharge rate also will be raised from the present 13,580 bbl. an hour to more than 40,000 bbl. when construction is finished.

Crude received at the terminal is moved by pipeline to the nearby 128,000-bbl. Torrance refinery. Much of Mobil's California production goes through the terminal. About 500,000 bbl. of crude a month is moved from San Ardo field in Central California to the terminal.

**NEW STORAGE** will occupy outlined area as Mobil Oil expands its marine terminals in Los Angeles Harbor. Expansion plans also call for 36-in. pipeline from tanker terminal to new storage area.




**ALMOST 80% OF MALFUNCTIONS** give advance warnings measurable in days with length of time varying with seriousness of failures. Fig. 1.

# Heed warnings and forestall shutdowns

BY PAUL FINK
People's Natural Gas Co.

ALMOST all equipment failures give ample advance warning. Consolidated Natural Gas System has found that paying heed to such warnings with a properly staffed and equipped unit will repay its cost many times.

Consolidated's entry into the field of analyzing engine performance was the result of a desire to establish a preventive-maintenance program in 1954.

A joint committee was formed to study the existing maintenance program and to recommend necessary changes. The problem was approached as follows:

1. **Past procedures.** We discovered there are two schools of thought about maintenance programs. One believes in dismantling and rebuilding every year regardless whether the need indicates or not. The other believes in operating without repairs until a failure occurs or when the need arises.

2. **Record keeping.** The system of recording hourly the basic engine operations in a log book and filing the log book away was looked into and was found to be of little value.

3. **Major failures.** An attempt to analyze the major breakdowns over the past 20 years from the log books was a monumental task which required, in some cases, graphical plotting of engine data to determine trends or causes.

This study uncovered several startling facts. We found that all of the shutdowns caused by equipment failure gave a warning, the length of time of which varied according to the seriousness of the malfunction (Fig. 1).

The percentages of the malfunction shutdowns with various warning periods were divided into four groups:

1. 78% gave a warning period which could be measured in days (1-90 days).

2. 11% could be measured in hours (1-24 hours).

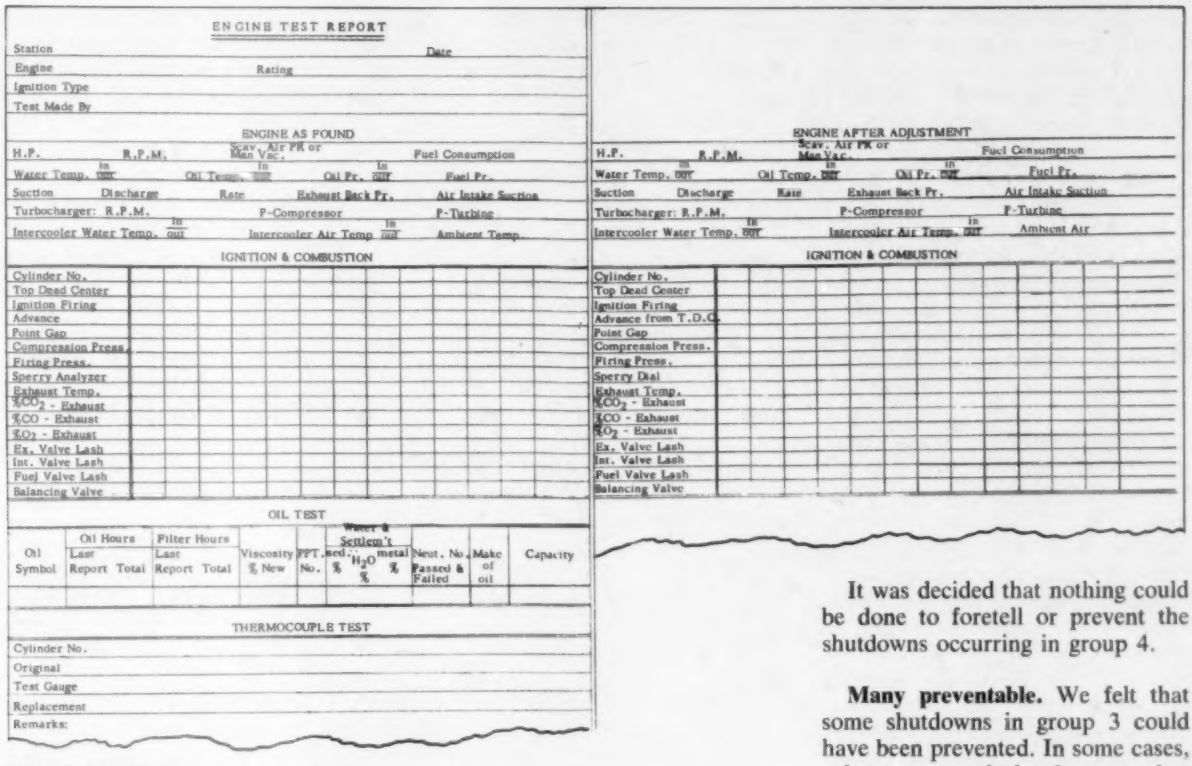
3. 6% could be measured in minutes (1-60 minutes).

4. 5% gave no advance indications of failure—thus, were considered instantaneous breakdowns.

A paper presented at the 1961 AGA Transmission Conference.

## Table of recommended equipment

| Recommended type of unit— | Wt. lb. | Cost | Remarks |
|---|---|---|---|
| Four-door station wagon (V-8) or GM Suburban (V-6) | | $3,800 | Station wagon should be equipped as follows: (a) Optional heavy-duty suspension. (b) Fresh-air heater. (c) Two-speed windshield wipers. (d) Window washer. (e) Roof rack. (f) Twin-traction rear end. |
| Hewlett packed engine analyzer with Kistler pickups and accessories | 50 | $2,500 | Complete with all standard attachments—dual channel. |
| Orsat gas analyzer | 20 | $100 | |
| Heat prover | 25 | $1,000 | |
| Gerin oil-testing kit | 40 | $250 | Complete. |
| "Simpson" multimeter | 5 | $60 | |
| Strobotach | 15 | $500 | With Strobolume accessory. |
| Dial indicator | 10 | $75 | |
| Rubicon galvanometer | 20 | $150 | |
| Hand tachometer | 2 | $50 | |
| Selection of small hand tools | 100 | $200 | Assorted wrenches (open-end, socket, and special), screw drivers, pliers, gages, etc. |
| Korfund pi meter | 25 | $500 | |
| Timing light | 5 | $35 | |



ENGINE TEST REPORT

Station — Date

Engine — Rating

Ignition Type

Test Made By

ENGINE AS FOUND

H.P. — R.P.M. — Scav. Air PR or Man Vac. — Fuel Consumption

Water Temp. in/out — Oil Temp. in/out — Oil Pr. in/out — Fuel Pr.

Suction — Discharge — Rate — Exhaust Back Pr. — Air Intake Suction

Turbocharger: R.P.M. — P-Compressor — P-Turbine

Intercooler Water Temp. in/out — Intercooler Air Temp in/out — Ambient Temp.

IGNITION & COMBUSTION

| Cylinder No. | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Top Dead Center | | | | | | | | | | | | | | |
| Ignition Firing | | | | | | | | | | | | | | |
| Advance | | | | | | | | | | | | | | |
| Point Gap | | | | | | | | | | | | | | |
| Compression Press. | | | | | | | | | | | | | | |
| Firing Press. | | | | | | | | | | | | | | |
| Sperry Analyzer | | | | | | | | | | | | | | |
| Exhaust Temp. | | | | | | | | | | | | | | |
| $\%CO_2$ - Exhaust | | | | | | | | | | | | | | |
| %CO - Exhaust | | | | | | | | | | | | | | |
| $\%O_2$ - Exhaust | | | | | | | | | | | | | | |
| Ex. Valve Lash | | | | | | | | | | | | | | |
| Int. Valve Lash | | | | | | | | | | | | | | |
| Fuel Valve Lash | | | | | | | | | | | | | | |
| Balancing Valve | | | | | | | | | | | | | | |

ENGINE AFTER ADJUSTMENT

H.P. — R.P.M. — Scav. Air PR or Man Vac. — Fuel Consumption

Water Temp. in/out — Oil Temp. in/out — Oil Pr. in/out — Fuel Pr.

Suction — Discharge — Rate — Exhaust Back Pr. — Air Intake Suction

Turbocharger: R.P.M. — P-Compressor — P-Turbine

Intercooler Water Temp. in/out — Intercooler Air Temp. in/out — Ambient Air

IGNITION & COMBUSTION

| Cylinder No. | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Top Dead Center | | | | | | | | | | | | | | |
| Ignition Firing | | | | | | | | | | | | | | |
| Advance from T.D.C. | | | | | | | | | | | | | | |
| Point Gap | | | | | | | | | | | | | | |
| Compression Press. | | | | | | | | | | | | | | |
| Firing Press. | | | | | | | | | | | | | | |
| Sperry Dial | | | | | | | | | | | | | | |
| Exhaust Temp. | | | | | | | | | | | | | | |
| $\%CO_2$ - Exhaust | | | | | | | | | | | | | | |
| %CO - Exhaust | | | | | | | | | | | | | | |
| $\%O_2$ - Exhaust | | | | | | | | | | | | | | |
| Ex. Valve Lash | | | | | | | | | | | | | | |
| Int. Valve Lash | | | | | | | | | | | | | | |
| Fuel Valve Lash | | | | | | | | | | | | | | |
| Balancing Valve | | | | | | | | | | | | | | |

OIL TEST

| Oil Symbol | Oil Hours Last Report | Oil Hours Total | Filter Hours Last Report | Filter Hours Total | Viscosity % New | PPT. Acid No. | Water & Settlem't % $H_2O$ | Water & Settlem't % metal | Neut. No. Passed & Failed | Make of oil | Capacity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

THERMOCOUPLE TEST

| Cylinder No. | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Original | | | | | | | | | | | | | | |
| Test Gauge | | | | | | | | | | | | | | |
| Replacement | | | | | | | | | | | | | | |

Remarks:

**REPORT FORMS**, prepared in triplicate, enable operating supervisors to evaluate the performance of testing unit. Fig. 2.

## for engine testing program

| Recommended type of unit— | Wt. lb. | Cost | Remarks |
|---|---|---|---|
| Manometers | 10 | $75 | Several 0-30-in. Hg 0-15-in. $H_2O$ 0-15-in. Hg 0-3-in. $H_2O$ |
| Test gages (pressure) | 15 | $100 | Set for both high and low pressures. |
| Stand for Sperry or Keesler generator | 50 | $25 | To be fabricated by company. |
| Thermometers (mercury) | 2 | $35 | Set (for water, oil, flue-gas temp.). |
| Extension cord, 50 ft. | 5 | $5 | |
| Oil-test supplies | 50 | $50 | KOH samples, alcohols, sample bottles, etc. |
| Rolls for cables | 20 | $15 | Fabricated by company. |
| Pipe and copper-tubing fittings | 10 | $15 | |
| Indicator cocks | 25 | $250 | Quantity—25. |
| Engine manuals, books, forms, paper, etc. | 100 | | |
| Luggage | 100 | | |
| Mounting built in vehicle to hold equipment | 100 | | |
| Driver and passenger | 400 | | |
| Miscellaneous weight | 200 | | |
| Total | 1,404 | $9,780 | |

Note: (1) Total weight does not include weight of vehicle. (2) The prices and weights shown are estimated.

It was decided that nothing could be done to foretell or prevent the shutdowns occurring in group 4.

**Many preventable.** We felt that some shutdowns in group 3 could have been prevented. In some cases, a few were caught by the most alert operators. The apparent malfunctions that were caught in group 3 would not be possible in one-man supervised shutdowns. We definitely felt that a large percentage of shutdowns in group 2 should have been eliminated and that there was little excuse for any of the malfunctions in group 1 ever reaching major proportions.

We also discovered a relationship between the educational level of the operating personnel and the group of impending failures. Certain personnel will correctly interpret these indications or warning signals and perform preventive measures while the others do not. This is material for a complete separate study and will not be considered at this time.

The recommendation at that time was that a qualified mechanical engineer be given charge of the complete testing program. He would be equipped with all the necessary technical tools required to make complete tests from fuel-gas analysis to exhaust-gas analysis. The equipment required for such a testing program is listed in the accompanying table.

**Report system.** It was also necessary to develop a report form and reporting system that would enable

operating supervision to evaluate the performance of this testing unit (Fig. 2). A report form was devised and has proved to be very satisfactory. Three copies of the form are to be made during the testing—a copy for station file, a copy for the supervisor in charge of operations file, and a copy for mechanical engineering department file.

Selection of personnel to operate this equipment is the most critical and should be made wisely. He must know thoroughly the theory and the chemistry of combustion and should definitely have a good understanding of the practical operation of the equipment involved. The ideal individual would be a highly trained mechanical engineer who has specialized in internal-combustion power with many years' experience in engine design and repair. Since such an individual would be difficult to obtain, we decided to operate the testing equipment with a two-man crew—one highly trained technical man and the other a highly skilled and experienced engine repairman.

This combination has proved to be a very good working team and has improved the operating performance of our equipment sufficiently to justify its existence. Learning to operate this highly technical electrical engine-testing equipment properly and to read and interpret the results takes up to a year. Immediate savings and improvements in operations can be realized during this period as well as afterwards.

**Fuel major cost.** One of the largest cost items that confronts gas companies operating several compressor stations is fuel. Ours runs almost 40% of the total operation costs. Therefore, fuel consumption is a prime target for this testing program. From the use of their testing equipment improper fuel-valve adjustments, improper engine balancing and loading, and incorrect engine ignition timing can be rectified and fuel savings can be and have been realized.

This testing unit will also discover many unimagined discrepancies pertaining to compressor engines and their performance and operation. Such discrepancies discovered were:

1. Timing marks on flywheels off as much as 2° to 12°.

2. Completely incorrect firing orders, even though cast in the equipment and found in instruction manual.

3. Improper type of magnetos installed.

4. Air scavengers to cylinders found unbalanced on supercharged as well as normally aspirated engines.

5. Cams on valve mechanisms on four-cycle engines improperly cut.

6. Compressor-cylinder clearance pockets having different per cent clearance from that stated by the manufacturer.

**Savings large.** These are just a few of the major discrepancies found. Numerous other smaller details which affect engine operation and performance were uncovered.

There is no question that a unit such as this can show an operating savings many times its cost, if given an opportunity and if properly accepted by management.

Generally, the first reaction by old-guard station operators is one of hostility. However, this soon changes into an attitude of admiration and respect for this equipment.

A secondary benefit to such a unit is that it offers an excellent training program for young engineers as well as older employes. It is surprising the interest the old station engineer will display when this unit substantially reduces his operating cost.

## NELSON COST INDEXES

### Refinery construction (1946 basis)

Explained on page 101 of the issue of August 5, 1957

| | 1954 | 1957 | 1959 | 1960 | June 1961 | July 1961 | Aug.* 1961 |
|---|---|---|---|---|---|---|---|
| Pumps, compressors, etc. | 166.5 | 206.7 | 226.5 | 228.3 | 229.1 | 229.1 | 229.1 |
| Electrical machinery | 160.0 | 188.9 | 195.8 | 195.2 | 193.0 | 192.8 | 192.8 |
| Internal-comb. engines | 150.5 | 173.9 | 178.5 | 180.7 | 181.3 | 181.3 | 181.5 |
| Instruments | 154.6 | 187.4 | 201.0 | 202.5 | 207.5 | 207.5 | 207.5 |
| Heat exchangers | 171.7 | 203.6 | 178.9 | 194.0 | 186.3 | 186.3 | 186.3 |
| Misc. equip. average | 160.7 | 192.1 | 196.1 | 200.0 | 199.4 | 199.4 | 199.4 |
| Materials component | 174.6 | 201.9 | 207.8 | 207.6 | 207.7 | 207.6 | 207.9 |
| Labor component | 183.3 | 208.6 | 231.6 | 241.9 | 249.8 | 251.0 | 251.5 |
| Nelson construction index | 179.8 | 205.9 | 222.1 | 228.2 | 233.0 | 233.6 | 234.1 |

### Refinery operating (1956 basis)

Explained on page 171 of the issue of June 1, 1959

| | 1952 | 1954 | 1959 | 1960 | May 1961 | June* 1961 | July* 1961 |
|---|---|---|---|---|---|---|---|
| Fuel cost | 81.0 | 86.5 | 103.5 | 109.9 | 108.2 | 106.1 | 104.0 |
| Labor cost | 88.7 | 90.9 | 102.3 | 100.3 | 101.7 | 104.3 | 102.0 |
| Wages | 81.5 | 88.7 | 111.5 | 113.0 | 118.7 | 120.8 | 120.8 |
| Productivity | 90.2 | 97.1 | 109.0 | 112.9 | 116.7 | 115.8 | 118.3 |
| Investment, maint., etc. | 83.6 | 92.0 | 113.7 | 116.9 | 118.5 | 119.2 | 119.6 |
| Chemicals cost | 72.1 | 85.7 | 107.8 | 114.3 | 104.9 | 104.0 | 103.2 |
| Operating cost indexes: | | | | | | | |
| Refinery | 80.5 | 88.7 | 106.8 | 108.8 | 108.2 | 109.1 | 107.9 |
| Process units† | 82.2 | 88.4 | 106.0 | 107.2 | 108.1 | 108.3 | 107.8 |

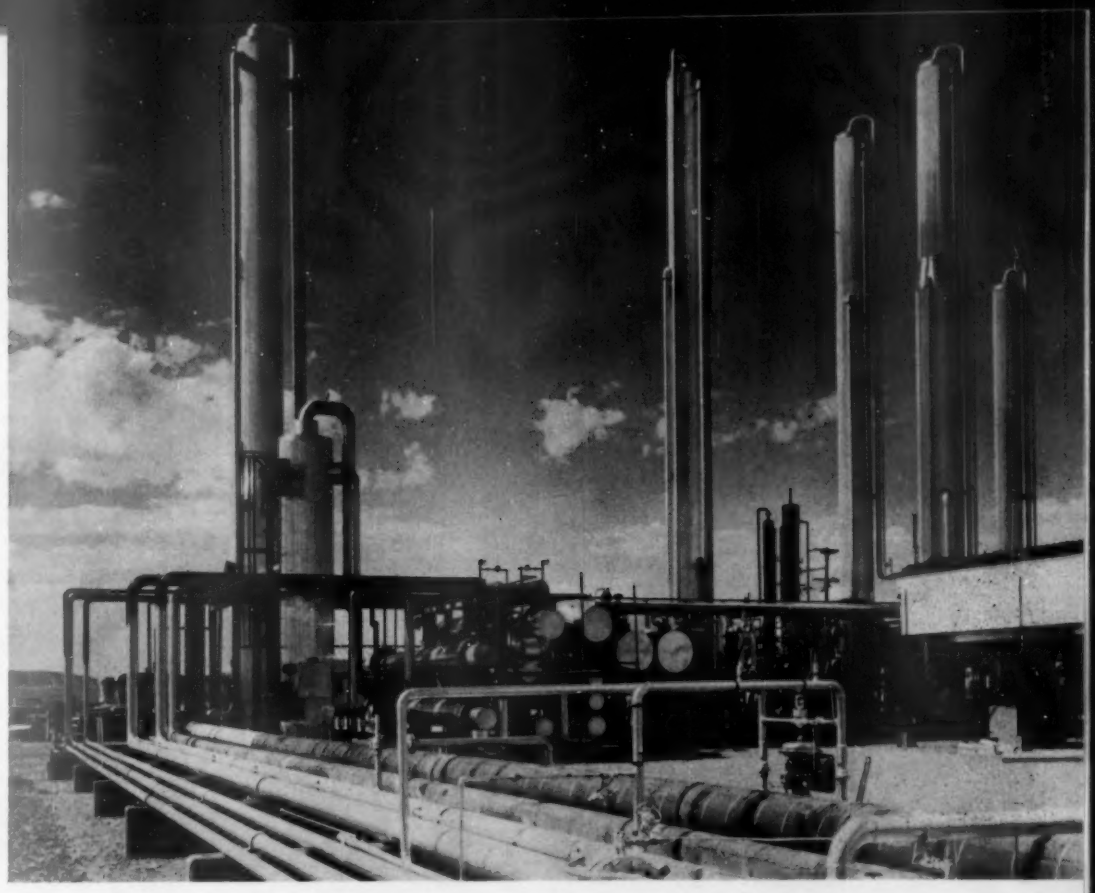
*Preliminary

†Add separate index for chemicals, if any are used.

These indexes are published in the first issue of each month. They are compiled by W. L. Nelson, technical editor and petroleum refinery consultant, Tulsa.

Charts of the indexes are published each year in a late January or early February issue.

Indexes of selected individual items of equipment and materials are also published in the first issue of the months of January, April, July, and October.



THIS new plant in Wyoming, the first for Union Pacific Railroad, is helping to conserve natural gas in Patrick Draw field. Near Rock Springs, it was built at a cost of about $3,250,000, has a capacity of about 28 M.M.c.f.d., and will recover propane, butane, and natural gasoline.

## Gas processing and refining:

# 80 projects under way or planned

### New construction report for U. S. and Canada lists 44 gas-processing projects. Refinery jobs to include large plant on Gulf Coast.

BY ROBERT B. BIZAL
Editorial research

A RASH of gas-processing construction in Canada, new helium plants in the U. S. Southwest, and a proposed refinery for the Gulf Coast highlight current construction activity.

The Oil and Gas Journal's latest summary of construction shows more than 40 gas-processing plants under way or planned. These include 14 in Canada, most of them with large capacities.

The U. S. Government's push for more helium has brought about a recent contract for the world's largest helium-extraction plant. It will be built at Liberal, Kans., by National Helium Corp., which was recently formed by Panhandle Eastern Pipe Line Co., and National Distillers & Chemical Corp.

Other helium plants will be built at Bushton, Kans., by Helex Co., a subsidiary of Northern Natural Gas Co., and at Ulysses, Kans., by Cities Service Helium, Inc. Other companies are negotiating with the Interior Department for contracts to build helium plants.

Most of the 37 refinery-construction projects listed in the new survey are downstream facilities or new units replacing old ones.

Standard Oil Co. of California is planning a 100,000-bbl. refinery at Pascagoula, Miss. Earlier this year, the company announced plans for a new refinery in Alaska.

Also announced earlier this year by Shell Oil Co. was a new refinery near Smyrna on Delaware Bay. This would be Shell's first for the East Coast.

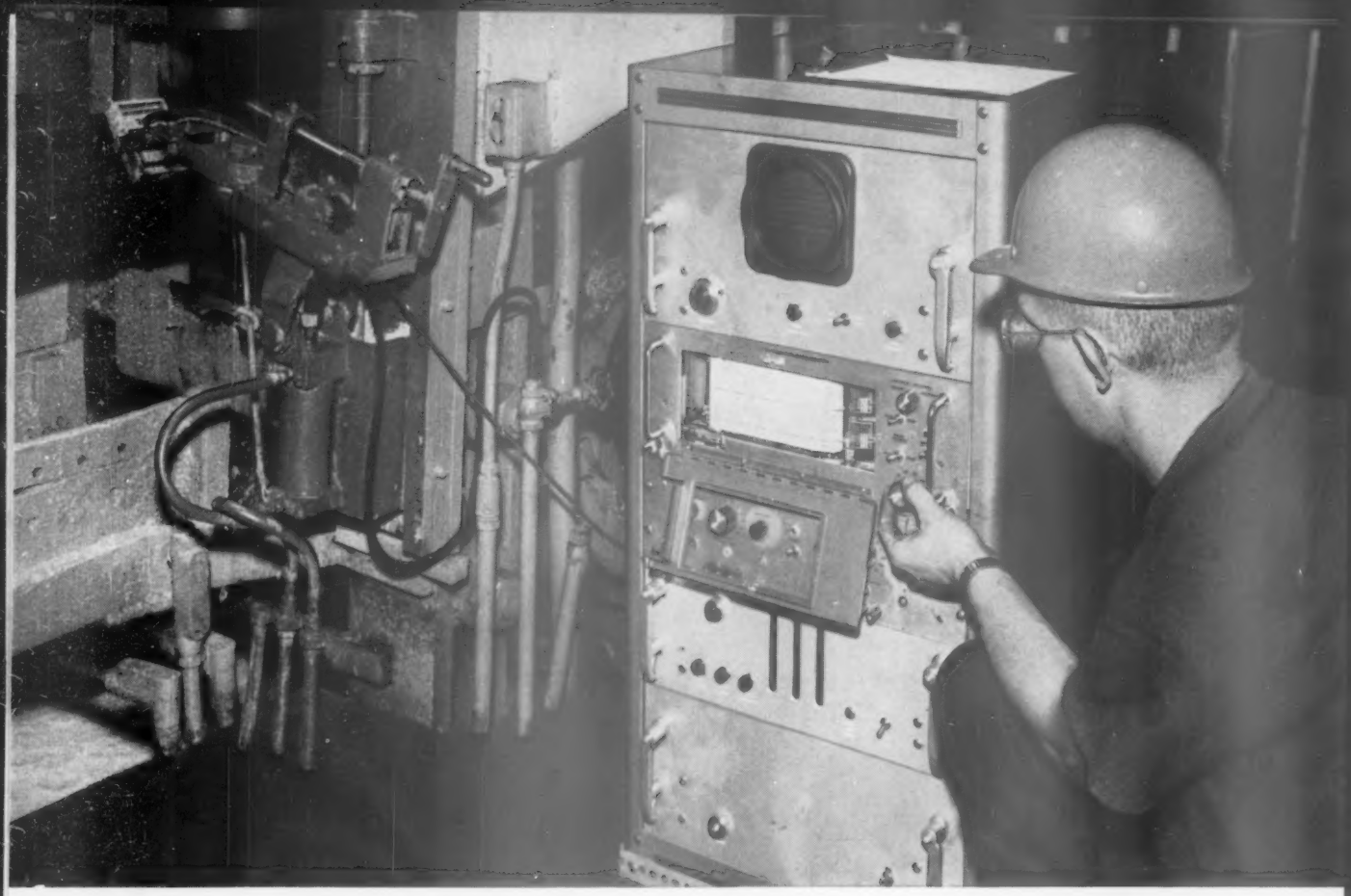
Refinery construction in Canada includes Shell's new 31,000-bbl. plant near Toronto, increased capacity at Imperial Oil's Sarnia refinery, and Canadian Kodiak Refineries, Ltd.'s, new small plant in Manitoba.

Following is a company-by-company rundown of new gas-processing and refining projects:

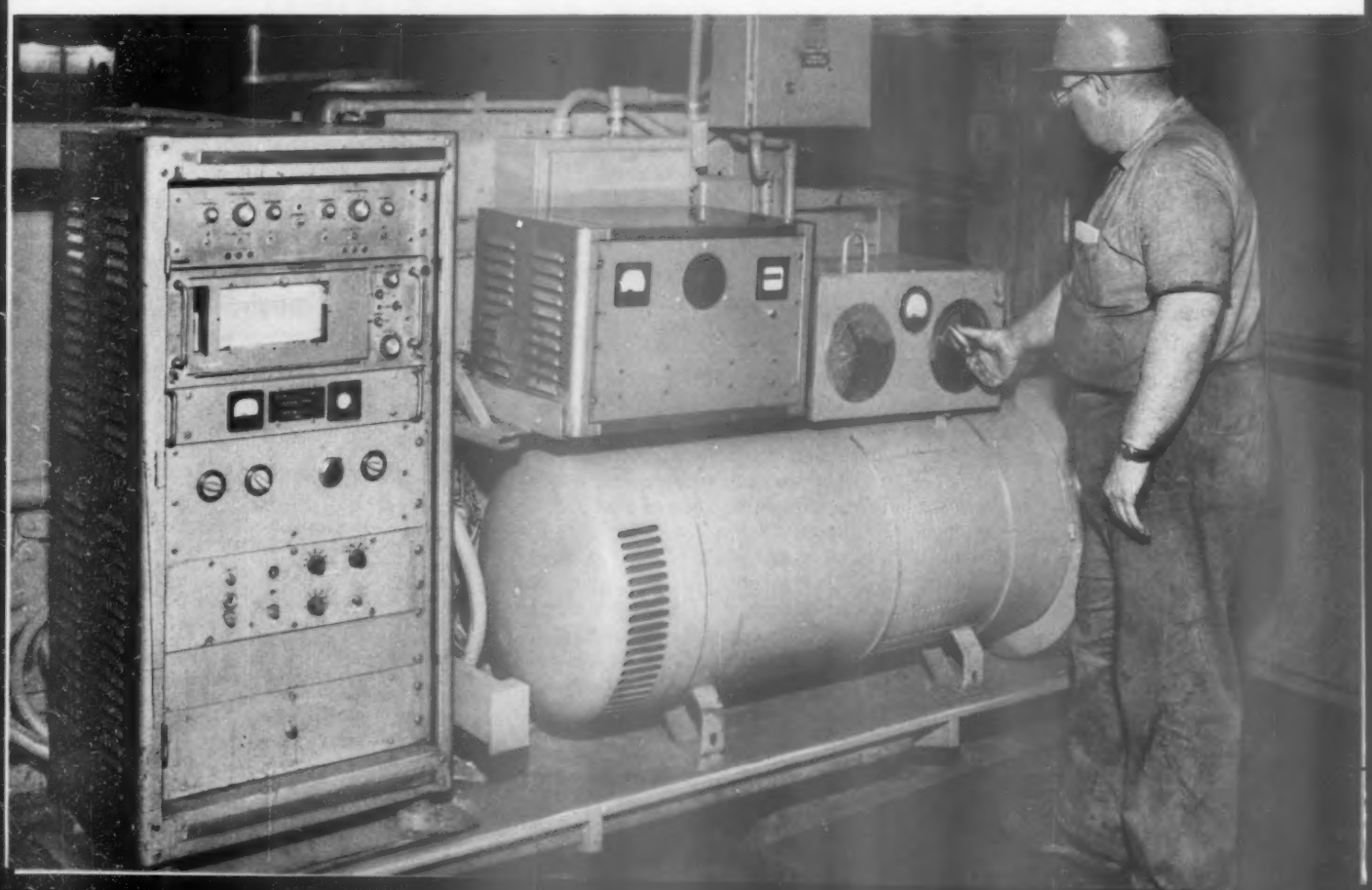
## Gas processing plants

**BANQUETE GAS CO.** (division of Crestmont Consolidated Corp.) and **HOUSTON NATURAL GAS PRODUCTION CO.** are building a $250,000 plant to handle 10 M.M.c.f.d. of gas in Goliad County, Texas. Recovery will be 9,600 gal. per day of liquids, using refrigerated-absorption process. Completion is scheduled December 1961. This plant, situated on a main line of Houston Pipe Line Co., would be the first of five to be built by Crestmont.

**CANADIAN FINA OIL, LTD.,** is scheduled to complete a new plant at Wildcat Hills,



**REPUBLIC ELECTRIC WELD** is available in 2⅜" through 16" O.D. Flat-rolled tolerances improve roundness and concentricity. Smoother inside surfaces mean less friction, less turbulence. In the past two and one half years, thousands of tons of Republic Electric Weld have been tested by an experimental nondestructive testing system. For complete information, call your nearest Republic representative or mail the coupon on the following page.



# No. 1 PROGRESS REPORT TO PIPELINERS:

## *Sonic-electromagnetic combination for nondestructive pipe inspection*

Now in daily operation, prototype sonic-electromagnetic inspection equipment has been operating in one Republic Pipe Mill since 1958. Thousands of tons of Republic Electric Resistance Weld Line Pipe have been tested.

Developed by Republic, this equipment can detect pipe irregularities that cannot be picked up by standard hydrostatic, visual, or electronic inspections. The system is unique because it inspects the weld area for the complete length of pipe . . . automatically . . . with both high frequency sound waves and induced currents.

Our goal is *total* reliability—to give you the greatest possible safety and economy. Use of the new sonic-electromagnetic equipment on all Republic Pipe Mills is foreseen in the near future.

Since 1955, thousands of man-hours have been devoted to new and better methods of nondestructive inspection of line pipe. This current program is backed by 25 years of development and production experience on small diameter tubing.

Steel

Strong
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# REPUBLIC STEEL

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Electric Weld • Seamless • Continuous Butt Weld • X-TRU-COAT
Plastic Pipe • Light Wall • Fusion Weld

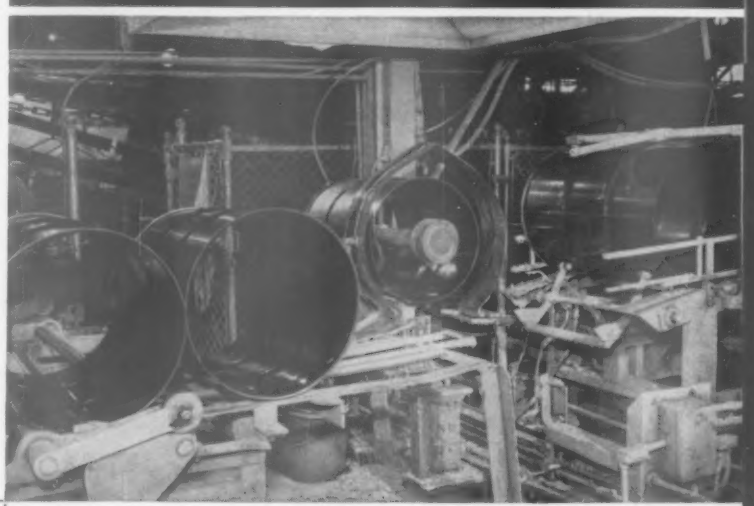
# FOR GREATER RELIABILITY...

## THE STRENGTH OF STEEL

Republic Light Wall Line Pipe has the strength needed to withstand dents, slashes, and ruptures in temporary field installations. Mechanical couplings speed joining and disassembly. Manufactured to API specification 5L or to applicable sections of this specification depending on wall thickness, Republic Light Wall Line Pipe can be joined with high speed mechanical couplings for temporary installations or by welding. Pipe is available in sizes from 1.315″ through 4.500″ O.D.

## HARD, WEAR-RESISTANT SURFACES

Republic Alloy Steels offer outstanding strength-to-weight ratios with the highest strength values. Uniform response to heat treatment assures complete deep-hardening penetration, wear-resistant surfaces. The nation's largest producer of alloy steels, Republic offers 3-DIMENSIONAL metallurgical service that helps you select, apply, and process the alloy steel best suited to requirements. Return coupon for information.



## ELECTROSTATIC LACQUERING

Republic's ELECTRO-LAC drum lacquering process assures better protection for your product. A fine lacquer mist is dispersed from a high speed distribution head. This mist is uniformly attracted (as a result of an electrostatic field produced in the drum) over the entire interior. Thin spots in the coating are eliminated. Ask your Republic Container salesman for details or mail the coupon.

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Please send more information on:

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- ☐ Republic Light Wall Line Pipe
- ☐ Alloy Steels
- ☐ Metallurgical Service
- ☐ Electrostatically Lined Drums

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

REPUBLIC STEEL

**REPUBLIC STEEL**

**REPUBLIC HAS THE FEEL FOR MODERN STEEL**

## Plant Construction (continued)

Alta., January 1962. Capacity is 80 M.M. c.f.d., with expected recovery of 42,000 gal. per day of liquids.

**CANADIAN-MONTANA GAS CO., LTD.,** is building an amine-treating plant for removal of $H_2S$ from 10 M.M.c.f.d. of sour gas in the Black Butte-Aden area of southeastern Alberta. Cost will be $279,000. Black, Sivalls & Bryson, Inc., has contract.

**CANADIAN SUPERIOR OIL OF CALIFORNIA, LTD.,** is building a new plant at Harmattan-Elkton field near Didsbury, Alta., with capacity of 100 M.M.c.f.d. Completion is scheduled in January 1962. Liquids production of 4,700 bbl. daily of stabilized condensate is planned. Process methods are compression and refrigeration.

**CINCINNATI GAS & ELECTRIC CO.** and its affiliate, Union Light, Heat & Power Co., plan a $2-million gas-processing plant near a new LPG underground storage cavern near Covington, Ky.

**CITIES SERVICE HELIUM, INC.,** has signed a contract with Interior Department for a helium plant near Ulysses, Kans., to process 505 M.M.c.f.d. of natural gas. Completion is scheduled early 1963. The contract is for 22 years.

**CITIES SERVICE PETROLEUM CO.** is building a new plant to process 10 M.M. c.f.d. in Calhoun County, Texas, about 4 miles north of Seadrift. Completion scheduled in December 1961. Austin Rankin Corp., Houston, is contractor.

**CONTINENTAL OIL CO.** will complete its new plant near Hennessey in Kingfisher County, Oklahoma, about December 1, 1961. Capacity of the $1,750,000 plant will be 30 M.M.c.f.d., and recovery will include propane, butane, and natural gasoline.

At Sacatosa field, Maverick County, Texas, Continental will complete a new plant with capacity of 2.5 M.M.c.f.d. in March 1962. Recovery will include about 18,000 gal. daily of propane, butane, and natural gasoline. Contractor is Delta Engineering Corp.

**CRESTMONT CONSOLIDATED CORP.** (See Banquete Gas Co. listing.)

**EL PASO NATURAL GAS CO.** is building a new plant near Jal, N. M., to process up to 650 M.M.c.f.d., with recovery of 588,000 gal. per day of ethane, propane, and butane.

**FLORIDA HYDROCARBONS CO.** (organized by Houston Corp.) was to start work on a new plant at Brooker, Fla., southwest of Jacksonville, shortly after FPC approval of a gas-line expansion proposal. FPC approved expansion in August 1961. Completion of the 330-M.M. c.f.d. plant would be in 1962 at a cost of about $7 million. Recovery will include about 45,000 gal. per day of gasoline and 90,000 gal. per day of butane.

**GAS TRUNK LINE OF BRITISH COLUMBIA** reportedly will build a plant at Fort Nelson with capacity of 530 M.M. c.f.d. at a cost of $20 million, with completion in 1962 or 1963.

**GRARIDGE CORP.** (See listing for Helium Conservation Corp.)

**HELEX CO.** (subsidiary of Northern Natural Gas Co.) has signed contract with Interior Department for construction of a $2?-million extraction plant at Bushton, Kans. It will produce raw helium at a rate of 700 M.M.c.f. annually. Completion by January 1963. Fluor Corp. will build the plant.

**HELIUM CONSERVATION CORP.,** Midland, Tex., is negotiating contract with Interior Department for a helium plant in the South White Deer area of Carson County, Texas. Graridge Corp. would be plant operator. Initial capacity would be 50 M.M.c.f.d. of natural gas.

**HELIUM, INC.** (owned jointly by Kansas-Nebraska Natural Gas Co. and Linde Co., subsidiary of Union Carbide Corp.) has application with Interior Department for construction of a helium plant in the Scott City, Kans., area.

**HOME OIL CO., LTD.,** was due to complete expansion program at the Carstairs-Elkton unit near Calgary, November 1961. Plant is being expanded from 70 to 200 M.M.c.f.d. Fluor Corp. of Canada, Ltd., is contractor. Estimated cost is $4.3 million.

**HOUSTON CORP.** (See listing for Florida Hydrocarbons Co.)

**HUDSON'S BAY OIL & GAS CO., LTD.,** will complete a dehydration plant at Pine Creek field, Alberta, December 1961. Capacity 160 M.M.c.f.d.

**HUMBLE OIL & REFINING CO.** is to complete a plant in Crane County, Texas, late 1961. Hudson Engineering Corp. is contractor. Capacity is 40 M.M.c.f.d. It's called the Sand Hills plant.

Near Hennessey, Okla., Kingfisher County, Humble will be operator for a group of more than 35 producer-owners at a new plant with ultimate design capacity of 77 M.M.c.f.d. Limited operation is expected before January 1, 1962. Complete facilities are expected to be finished by spring 1962. Cost of plant and related gathering system will be about $7.5 million.

**HUNT OIL CO.** is building a skid-mounted 12-M.M.c.f.d. plant near McGregor, N. D. Recovery from the North Tioga plant will amount to about 50,000 gal. per day of propane, butane, and natural gasoline. Completion by O. L. Olsen Co., Inc., scheduled December 1961.

**JEFFERSON LAKE PETROCHEMICALS OF CANADA, LTD.,** will operate facilities for sulfur recovery at a new plant in Calgary field, Alberta. (See Petrogas listing for details.)

**KERR-McGEE OIL INDUSTRIES, INC.,** was due to go on stream this month at a helium plant in Pinta Dome field, Apache County, Arizona. It is the first privately owned helium plant in the U. S. and will produce 200,000 standard cubic feet of helium per day.

**MOBIL OIL OF CANADA, LTD.,** plans a plant in the Wimborne area of Alberta.

**NATIONAL DISTILLERS & CHEMICAL CORP.** (See National Helium listing below.)

**NATIONAL HELIUM CORP.** (newly formed by Panhandle Eastern Pipe Line Co. and National Distillers & Chemical Corp. recently announced 20-year contract with U. S. Government for construction of the world's largest helium plant. Located at Liberal, Kans., it will be designed to produce 1,000 M.M.c.f. per year of helium. Throughput will be 1,000 M.M.c.f.d. of natural gas. Construction will start mid-1962, with completion in about 2 years.

**NGL CORP.** plans a plant on the Sabine River south of Orange, Tex., to process 20,000 bbl. per day of gas condensate and/or natural gasoline. Estimated cost $9.5 million.

**NORTHERN NATURAL GAS CO.** (For helium plant, see Helex Co. listing.)

**PAN AMERICAN PETROLEUM CORP.** will start construction first quarter 1962 at the South Thornwell plant in Louisiana. The project is on a 50-50 basis with Austral Oil Co., Inc., and Pan American will be operator. Capacity: 75 M.M.c.f.d. of natural gas, 3,200 bbl. per day distillate, and 33,000 gal. per day of LPG.

Pan American's new Whitecourt, Alta., plant is due for completion early in 1962. Capacity will be 200 M.M.c.f.d. with products expected to amount to 610,000 gal. per day. Brown & Root, Inc., is contractor.

**PANHANDLE EASTERN PIPE LINE CO.** (For helium plant see National Helium Corp. listing.)

**PETROGAS PROCESSING, LTD.,** organized by 28 companies, is due to complete gas-processing plant in Calgary field. Alberta, December 1961. Capacity is 150 M.M.c.f.d., with expected daily recovery of 2,200 bbl. of stabilized condensate, 107 M.M.c.f. of residue gas, and 863 long tons of sulfur. Jefferson Lake Petrochemicals of Canada, Ltd., will handle sulfur recovery. Over-all cost of the plant is about $13 million.

**PORT GAS PROCESSING CO.** (division of Hudson Gas & Oil Corp.) was to complete a new plant November 1961 in Jefferson County, Texas. Capacity is 150 M.M.c.f.d. Early Co. is contractor for the $5-million project.

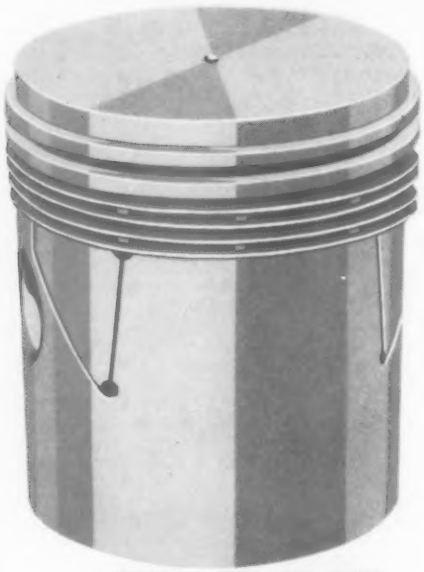
**SARATOGA PROCESSING CO., LTD.,** was due to complete new $11-million plant this month to process 75 M.M.c.f.d. of sour gas from Savanna Creek field, Alberta. Canadian Bechtel, Ltd., has contract. Sulfur-recovery facilities will be property of Jefferson Lake Petrochemicals of Canada, Ltd. Sulfur recovery will amount to about 370 long tons per day.

**SHELL OIL CO.** was to complete a new plant in Bryans Mill field, Cass County, Texas, this month. Capacity is 30 M.M. c.f.d., with estimated recovery of 5,600 bbl. of condensate, 130 tons of sulfur, and 18 M.M.c.f. of sweetened, dehydrated gas per day.

At Person field, Karnes County, Texas, Shell will be operator of a new $1.5-million plant with capacity of 16 M.M. c.f.d. Liquids recovery will be 19,000 gal. per day.

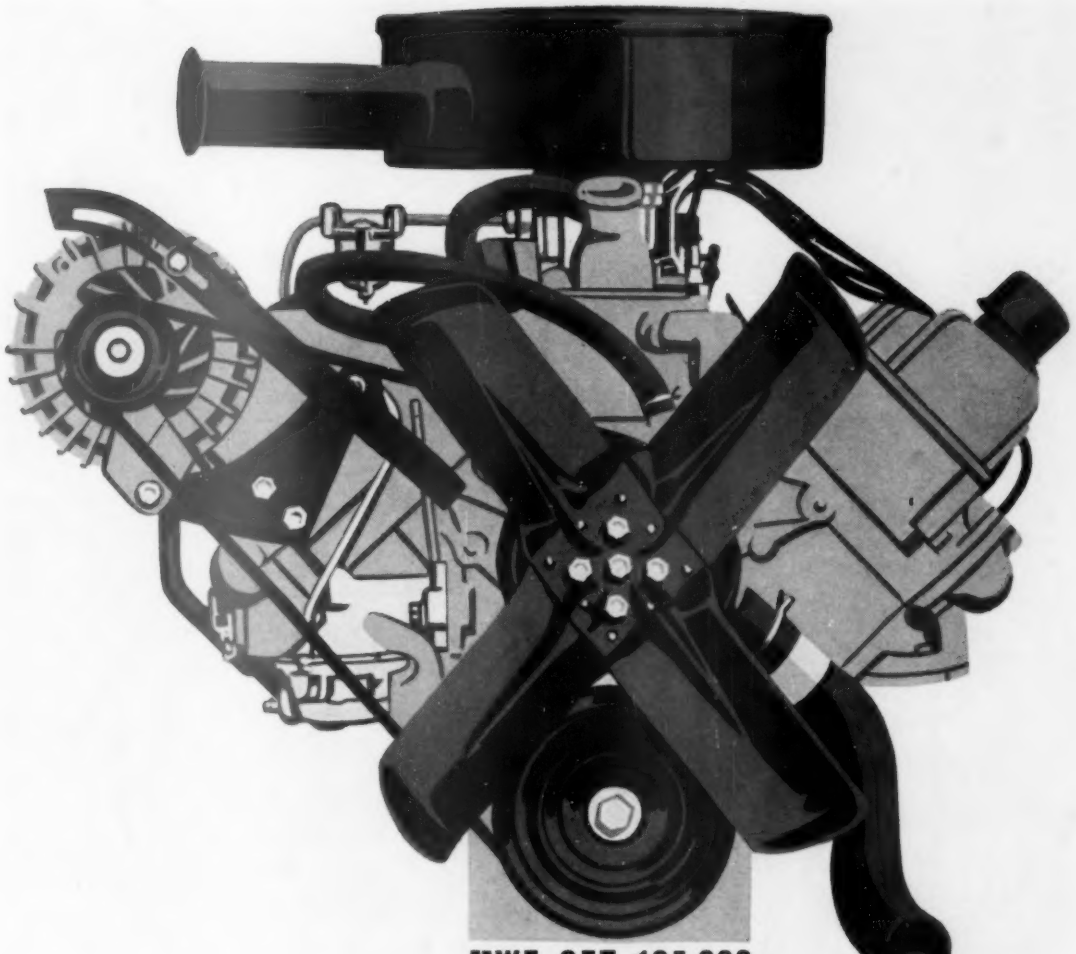
Shell will also be operator of a joint venture for a 650-M.M.c.f.d. plant near Ysclosky, La., southeast of New Orleans. It will extract about 10,000 bbl. per day of liquids, which will be separated by Union Texas Natural Gas Corp.'s Toca, La., plant near Ysclosky. Completion is scheduled about May 1, 1962. Process will be absorption.

**SHELL OIL CO. OF CANADA, LTD.,** was



"ALL 102 OF OUR '48 DODGES HAVE GONE AN AVERAGE OF 90,000 MILES EACH WITHOUT A PISTON OR A RING BEING REPLACED."

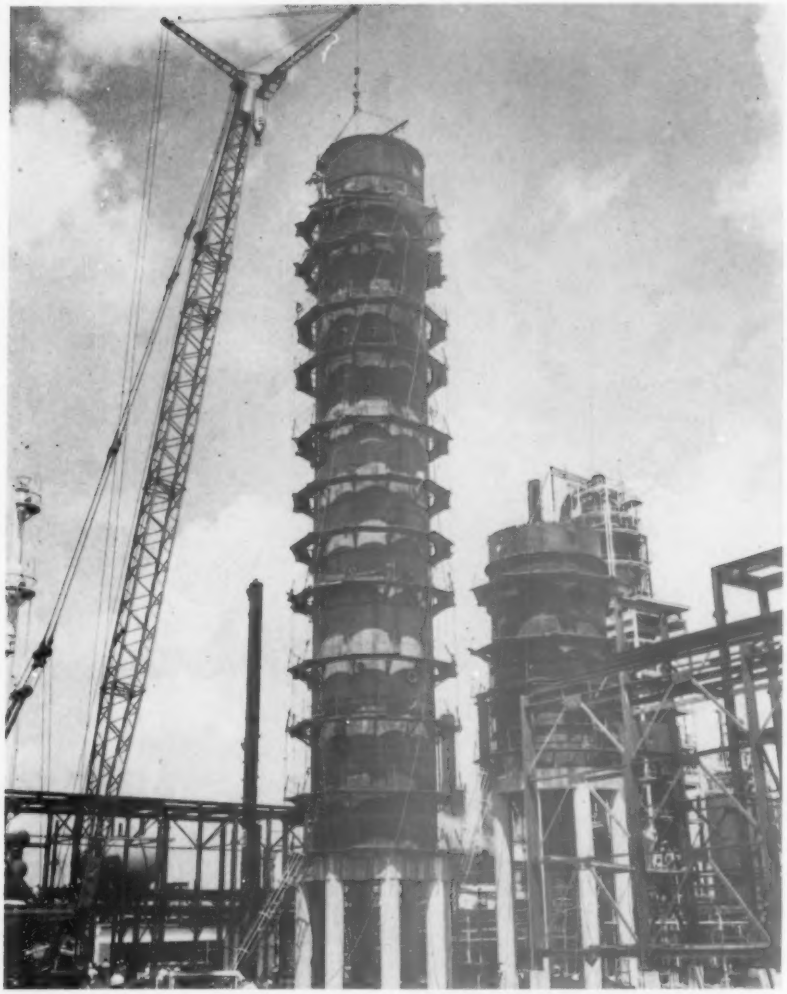
Capitol Dairy Co., Chicago, Illinois



**"WE GET 125,000 TO 140,000 MILES FROM THE ENGINES IN OUR 8 DODGES BEFORE WE THINK OF REPLACING 'EM."**

W. Hudman, Livestock Trucker,
Lubbock, Tex.

**DODGE TRUCKS FOR 1962** have more than 50 engineering advances that make them tougher, more tight-fisted than ever. Included are new 2-speed axles, heavier transmissions, more economical diesel power, and new distributors and starters. See and drive the 1962 Dodges—America's only Job-Rated trucks—at your Dodge dealer's.



**THIS NEW TOWER** for crude distillation replaces outmoded facilities at Signal Oil & Gas Co.'s Houston refinery. Construction, scheduled for completion in December 1961, includes a combination crude-distillation, vacuum, and visbreaker unit with capacity of 60,000 bbl. daily.

## Plant Construction (continued)

due to complete an 88-M.M.c.f.d. plant at Crossfield, Alta., fall 1961.

In the Waterton-Pincher Creek area of southwestern Alberta, Shell was to complete a new plant with capacity of 110 M.M.c.f.d. in fall of 1961. Recovery will include 7,780 bbl. of liquids and 1,413 long tons of sulfur daily. Canadian Bechtel, Ltd., has contract.

**SOUTH LOUISIANA PRODUCTION CO., INC.** (subsidiary of Central Louisiana Electric Co. and Tidewater Oil Co.) will complete a new plant at St. Landry, La., in December 1961. Production from 40 M.M.c.f.d. of gas will include 484 bbl. of propane, 278 bbl. of butane, and 107 bbl. of natural gasoline. Cost will be $1 million.

**STANDARD OIL CO. OF CALIFORNIA** and **HUMBLE OIL & REFINING CO.** will complete a 20-M.M.c.f.d. plant at Carpinteria, Calif., in January 1962, to process gas from offshore properties. Southwestern Engineering Co. has contract for the $500,000 unit.

**STEELMAN GAS, LTD.,** will start construction spring 1962 at a plant near Edmonton, Alta., to treat pipeline-gas streams. Initial capacity when it goes into operation fall 1962 will be 70 M.M.c.f.d. Recovery will include 1,308 bbl. of propane and 464 bbl. of butane daily.

**SUBURBAN PROPANE GAS CORP.,** Whippany, N. J., was to complete a 20-M.M.c.f.d. plant for production of propane, butane, and natural gasoline before the end of 1961. The company purchased Frio-Tex Oil & Gas Co., which has gas wells, pipeline facilities, and leases in Frio County, Texas.

**SUNRAY MID-CONTINENT OIL CO.** will complete expansion at its Newhall plant in Los Angeles County, California, by March 1, 1962. Project will boost capacity from 40 to 70 M.M.c.f.d.

Sunray's new Calhoun plant at Palacios, Tex., was due for completion November 1961. Capacity is 20 M.M.c.f.d., with expected recovery of 18,000 gal. of liquids per day.

At Northwest Branch field, Acadia Parish, Louisiana, Sunray was completing an expansion program from 30 to 44 M.M.c.f.d. in November.

**TIDEWATER OIL CO.** is building a plant at Normanna field, Bee County, Texas. Capacity will be 30 M.M.c.f.d., with recovery of 1,200 bbl. daily in addition to separator condensate.

**TRANSWESTERN PIPELINE CO.** plans gas-processing facilities along its new line in California.

**UNION TEXAS NATURAL GAS CORP.** is building a plant at Cox Bay, near Shell's new Yscloskey plant in Louisiana.

**WESTERN LEASEHOLDS, LTD.** (See Canadian Fina listing for details of Wildcat Hills plant.)

## Refining plants

**AMERICAN OIL CO.,** Sugar Creek, Mo., will complete a crude-distillation unit with capacity of 70,000 bbl. per day by July 1962. This will replace four existing crude-distillation units. Current capacity of 970,000 bbl. per year of asphalt will be increased by 50%.

At Texas City, new 150,000-bbl. crude unit was due on stream this fall. This boosts capacity from present 160,000 to 165,000 bbl. per stream day. Vacuum capacity is being increased from present 33,000 to 59,000 bbl. this fall. Fluid cat cracking capacity is being increased from 64,000 to 112,000 bbl., and recycle will be increased from 4,000 to 51,000 in November 1961. M. W. Kellogg Co. has contract on the above jobs. By January 1962, sulfuric acid alkylation capacity will be increased from 9,000 to 23,500 bbl., and a new 7,200-bbl. isomerization unit will be added by Fluor Corp., Ltd.

**APCO OIL CORP.,** Arkansas City, Kans., is building a 2,950-bbl. Lomax catalytic hydrocracking unit. A stream-reforming hydrogen plant is being built.

**ATLANTIC REFINING CO.,** Philadelphia, is expanding alkylation unit from 5,500 to 7,500 bbl. daily, with completion in November or December 1961.

**AURORA GASOLINE CO.,** Detroit, is adding a Platformer with capacity of 12,000 bbl. per calendar day, a 2,500-bbl. distillate Unifiner, and an 18,000-bbl. naphtha Unifiner, with completion by spring 1962.

**CANADIAN KODIAK REFINERIES, LTD.,** is building a new refinery at The Pas, Man., with completion of crude facilities at the $4,500,000 plant set for end of 1961. Capacity will be 3,000 bbl. daily. Cracking, reforming, and hydrodesulfurizing units will be completed by May 1962. Products will include premium and regular gasolines, diesel and fuel oil, jet fuel, residuals, and asphalt.

**CHEMOIL CORP.** plans to complete a new 40,000-bbl. refinery between New Orleans and Baton Rouge in 1963. Lummus Co. is contractor. Facilities would include fluid cat cracker, hydrofluoric acid alkylation unit, catalytic-polymerization unit, $C_5+$ isomerization unit, and asphalt and coke-producing facilities.

**CITIES SERVICE ATHABASCA, INC.,** Richfield Oil Corp., Imperial Oil Ltd., and Royalite Oil Co. have reportedly made technical breakthroughs at their 3,000-bbl. pilot plant for processing Athabasca tar sands of Alberta. Next step would be construction of a commercial plant to produce 100,000 bbl. daily of crude oil from the tar sands' bitumen.

## NOBODY OFFERS MORE CATALYST KNOW-HOW

To bridge the gap between selection of a catalyst and getting the most usefulness from it, HOUDRY offers you a background of more than 30 years' intensive experience in process design and operation—along with basic experience and proved capability in catalyst design and manufacture.*

HOUDRY catalysts for petroleum, petro-chemical and chemical processing are not only highly developed products, but are also proved in actual commercial use dating from the origination of commercial-scale catalytic processing. And in developing a wide range of catalysts, perfecting them, and bringing them to their fullest practical value, HOUDRY catalyst service personnel have also developed and perfected techniques and procedures . . . which make HOUDRY catalysts yield maximum usefulness for processors who choose them.

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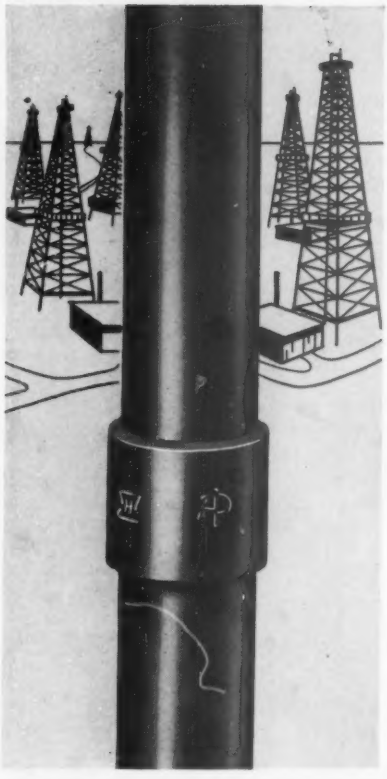


# HARRISBURG COUPLINGS

FOR OIL DRILLING AND WHEREVER PIPE COUPLINGS ARE USED Harrisburg Steel has been well-known for many years — well known for high quality seamless steel couplings — of strength and accuracy — with threads unexcelled in correctness of form, height, angle and lead.

Manufactured to A.P.I. specifications, Harrisburg tubing and casing couplings are under constant inspection for uniformity of quality — to bring to you a product which will meet the most critical requirements.

**FOR ALL TYPES OF COUPLINGS** Specify Harrisburg.

**HARRISBURG STEEL CO.**

Division of HARSCO CORPORATION
HARRISBURG 6, PENNSYLVANIA

## Plant Construction (continued)

Provincial and federal Governments' approval is required.

**CONSUMERS' CO-OPERATIVE REFINERIES, LTD.,** was due to complete expansion of its Regina, Sask., refinery from 16,000 to 22,500 bbl. per stream day fall 1961.

**FRONTIER SOUTHERN OIL CO.** (Frontier Refining Co.) has exercised option to buy a tract at Drummon Point, east of Jacksonville, Fla., for a new refinery, which would reportedly be completed in about 3 years.

**GOLDEN BEAR OIL CO.,** Oildale, Calif., plans to complete catalytic hydrogen-treating capacity of 1,000 bbl. daily, for lube feed stock, in 1962.

**GOLDEN EAGLE REFINING CO.,** Torrance, Calif., will replace existing crude-charging capacity of 9,000 bbl. per stream day with new 30,000-bbl. unit by January 1, 1963. Project includes 19,000-bbl. vacuum-distillation unit, 11,000-bbl. delayed-coking unit, 17,000-bbl. Platformer, 21,500-bbl. catalytic hydrocracking unit, and 5,300-bbl. Unifiner. Coke-producing capacity will be 460 tons per day.

**GREAT NORTHERN OIL CO.,** Pine Bend, Minn., is modifying existing units to provide increased gasoline production. Procon, Inc., has contract to revamp Thermofor catalytic cracking tower and add a second gas plant.

**GULF OIL CORP.,** Cincinnati, will completely modernize its 37,000-bbl. refinery, with construction to begin late 1961 and completion by fall 1962. Work will include a new atmospheric and vacuum crude-distillation unit, alkylation unit, hydrodesulfurizer for treating heating oils, carbon monoxide boiler, plus renovation of several existing units. Contractor is Bechtel Corp.

**IMPERIAL OIL LTD.,** Sarnia, Ont., is under way with a 16,000-bbl. per day increase in capacity. The expansion of distillation facilities, to cost about $3 million, will be completed spring 1962. Contractor is Canadian Bechtel Ltd.

**MOBIL OIL CO.,** East Chicago, Ind., will complete new crude-topping heater first quarter 1962, adding 2,000 bbl. to existing 39,300-bbl. per stream day crude-charge capacity.

**MURPHY CORP.,** Superior, Wis., was nearing completion on a program involving a 5,000-bbl. fluid cat cracker, a 1,200-bbl. hydrofluoric-acid alkylation unit, a 400-bbl. increase in distillate-fuel desulfurization capacity, and a 1,500-bbl. increase in gasoline-treating capacity. Completion scheduled in December or January 1962.

**NGL CORP.** plans to build a plant at Orange, Tex. (See complete details in gas-processing listing.)

**PHILLIPS PETROLEUM CO.,** Great Falls, Mont., will complete new catalytic reforming facilities early 1962. The modernization program also includes facilities for catalytic hydrogen treatment of distillates and other revisions for increasing crude-oil capacity.

At Woods Cross, Utah, Phillips will complete an alkylation unit by mid-1962.

**PURE OIL CO.,** Newark, Ohio, will complete an HF alkylation unit with capacity of 1,425 bbl. per day early 1962. Kaighin-Hughes-Litwin, Inc., is contractor.

**RICHFIELD OIL CORP.** has long-range plans for a $50-million refinery at Everett, Wash., with possible completion in 1965.

**SHELL OIL CO.,** Anacortes, Wash., is installing two hydrogen-treating units with combined capacity of 25,000 bbl. per day. Fluor Corp., Ltd., is contractor.

Long-range plans call for an $80-million refinery and petrochemical complex near Smyrna on Delaware Bay below Wilmington—the first East Coast refinery for Shell.

**SHELL OIL CO. OF CANADA, LTD.,** is scheduled to complete a new refinery at Bronte, near Toronto, Ont., in 1963, with capacity of about 31,000 bbl. daily.

**SIGNAL OIL & GAS CO.,** Houston, will complete new facilities in December 1961, including a combination crude-distillation, vacuum, and visbreaker unit, with capacity of 60,000 bbl. daily. It will replace outmoded facilities. Brown & Root, Inc., has contract.

The company also plans a new refinery at Signal Hill (Long Beach, Calif.).

**STANDARD OIL CO. OF CALIFORNIA,** Western Operations, Inc., will build a 20,000-bbl. refinery near Nikiski on the Kenai Peninsula in Alaska. Completion scheduled in 1963. A 481-acre tract was purchased in October.

Standard of California plans a 100,000-bbl. refinery at Pascagoula, Miss. Among the units planned is a 17,000-bbl. Isocracker. The big plant may be on stream by 1964.

At Barbers Point near Honolulu, the company will add a 13,000-bbl. per calendar day fluid cat cracker, a 3,800-bbl. sulfuric acid alkylation unit, and a 1,350-bbl. $C_4$ isomerization unit in 1962.

**STANDARD OIL CO. (OHIO)** will complete a new continuous automatic gasoline-blending system at its No. 1 Cleveland refinery by end of 1961. Cost of project is about $750,000.

At Toledo, Standard of Ohio was due to complete a 7,500-bbl. Isocracking unit in November 1961, with Ralph M. Parsons Co. contractor.

**SUN OIL CO.,** Marcus Hook, Pa., will build a fluid catalytic cracking unit with capacity of 84,000 bbl. per day. The unit and auxiliary equipment will cost $14 million and will go into operation in October 1962. The facilities will replace a fixed-bed unit which has been in operation a number of years.

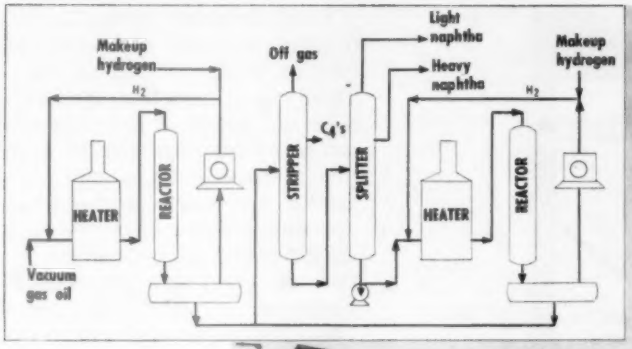
**SUNSHINE STATE REFINERIES, INC.,** is considering building a 25,000-bbl. refinery in the Tampa, Fla., area.

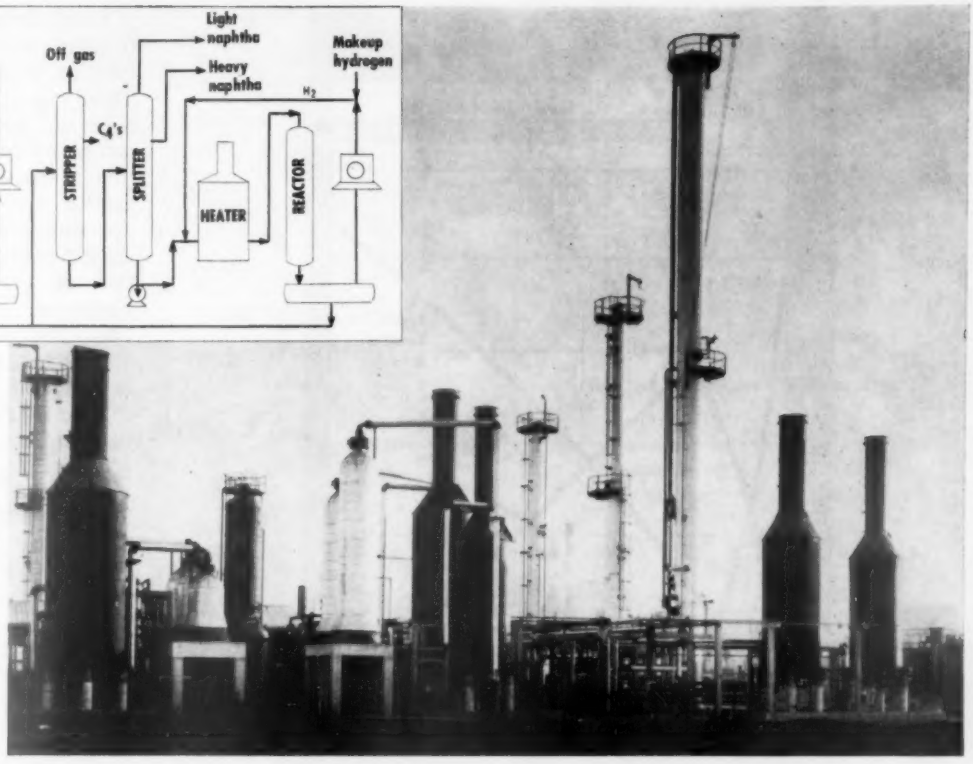
**TENNECO OIL CO.,** Chalmette, La., will complete a 7,000-bbl. catalytic hydrogen-treating unit late 1961. Feed type will be kerosine.

**TEXACO INC.,** Lockport, Ill., is building a 28,000-bbl. delayed-coking unit, with completion mid-1962. Foster Wheeler Corp. has the contract.

At Wilmington, Texaco is installing a new 12,000-bbl. hydrogen treating unit.

**TIDEWATER OIL CO.,** Avon, Calif., is due to complete a 20,000-bbl. Isocracking unit in mid-1962. Bechtel Corp. has the $20-million contract. The plant will include a 20,000-bbl. catalytic pretreater and a 50,000-M.c.f.d. hydrogen plant.



**POWERINE OIL'S** Lomax unit, the first in commercial operation, has been operating successfully since August. It has increased refinery gasoline production from about 20% with a 5-octane-number increase in pool octane.

New commercial and pilot-plant data on

# THE LOMAX PROCESS

**show the results of upgrading diesel oil, No. 2 fuel oil, and condensate to gasoline, and upgrading vacuum gas oil to diesel oil and gasoline.**

**BY JAMES G. ECKHOUSE**
Universal Oil Products Co.
Des Plaines, Ill.

THE FIRST commercial Lomax unit is producing about 118% yield of gasoline from a diesel-oil charge. It has increased over-all refinery gasoline production about 20% with a 5-octane-number increase in refinery pool octane after reforming the Lomaxate. And it has produced a low-bromine-number gasoline having a high sensitivity. The unit has been operating at Powerine Oil Co.'s Santa Fe Springs, Calif., refinery since August.

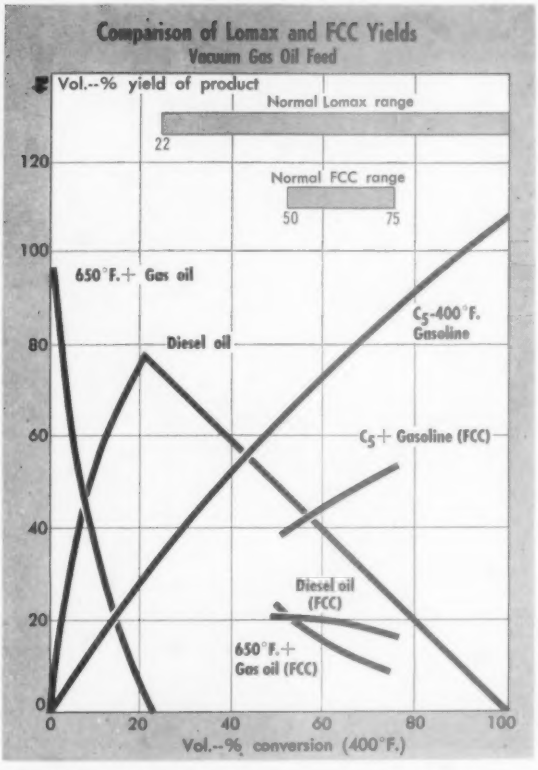
This refinery previously had two Platforming units and has now installed a third one designed to produce 100-clear-octane gasoline from the hydrocracked product.

Commercial operation has virtually duplicated pilot-plant results with the Powerine diesel-oil charge. Table 1 shows a comparison between the pilot-plant and commercial-charge product properties.

Note that the charge in the two cases is almost identical; however, exact comparison is not possible. Thermally cracked naphtha is pretreated in the commercial unit and this appears in the $C_7+$ Lomax product. If a correction is made for the nonhydrocracked $C_7+$ gasoline, then the commercial product is calculated to be higher in octane than the pilot-plant material. In addition, it has proved to be an exceptionally good feed stock to the Platformer.

Because the yields on pretreating naphtha are virtually 100%, the commercial over-all yields may be easily corrected for the naphtha which was included in the charge. Yields attributable to separately cracking the gas-oil portion of the charge may be determined; thus, yields are obtained on a 100% diesel-feed basis. These corrections hav been made and are compared in Table 2 with pilot-plant yields on straight diesel feed. Note that the yields compare closely and the pilot-plant operation thus is verified.

Presented to CNGA, Long Beach, Calif., October 1961, under the title "The UOP Lomax Process—Efficient, Versatile Refining Tool."




**FLEXIBILITY** of Lomax unit is demonstrated by its normal range of 22 to 100% conversion. Normal FCC range is about 50 to 75% conversion. Fig. 1.

### Pilot-Plant Data

A Wyoming vacuum gas oil was processed in a two-reactor pilot plant and the subsequent $C_7+$ product was sent to a reformer. When maximum gasoline is desired, two reactors are normally used; however, when maximum distillate production from heavy gas oil feeds is desired, a single reactor is employed.

In this series of tests, yields were carried out at 67.5% conversion to prove the ability of the process to operate at intermediate conversions and to make a direct comparison with a catalytic cracking unit operating at the same conversion.

Charge stock was a 21.6° API vacuum gas oil with a boiling range of 460°-945° F. and a UOP "K" factor of 11.55. The total yield at 67.5% conversion was 122.4 vol. %, of which 58.7% was $C_7$-390° F. gasoline and 32.5% was 400°+ F. diesel oil.

Product properties are shown in Table 3. Note that the diesel-oil product is of high quality when compared with a cut of the same boiling range which would be produced on a catalytic cracking unit. It requires no further treatment and is comparable to a virgin feed of the same boiling range in the original crude oil with the exception that it is practically free of sulfur and nitrogen, is stable, and has good color.

Over-all yields for the combined hydrocracking and reforming operations when producing 100-octane 10-lb.-R.v.p. gasoline are shown in Table 4.

**Conversion and yield.** The relationship between conversion and product yield is shown in Fig. 1. These curves have been synthesized since the figures at low conversion are based on single-reactor operation, whereas yields at higher conversion are based on two-reactor operation and, therefore, the curves are not necessarily continuous. Note that the heavy gas oil completely disappears at about 22% conversion. This represents single-reactor operation for maximum production of diesel oil.

Also in Fig. 1 FCC yields have been superimposed to compare FCC and Lomax operation. As indicated, the normal Lomax range extends from, say, 22 to 100% conversion; the normal FCC range would be about 50 to 75% conversion. This helps to illustrate the flexibility of the process.

Also of interest is the processing of condensate heavier than gasoline to ultimately convert it to gasoline. Table 5 shows yields and product properties when processing a 42.8° API 400°-700° F. - boiling - range condensate to ultimate gasoline.

**Economics and profitability.** The situation many refiners are faced with today is one in which the heavy-gas-oil fractions of crude are being catalytically cracked and the cycle-oil products, together with light virgin distillates, are in overall excess because of the poor No. 2 fuel-oil market.

Converting No. 2 fuel oil to gasoline shows a good payout where processing is carried out through an entirely self-contained combination of units. There is no interchange

**Table 1—Properties of charge and products pilot-plant and commercial operations**

| | Charge | | Product | | |
|---|---|---|---|---|---|
| | Diesel oil | | Pilot plant | Commercial† | |
| | Pilot plant | Commercial | $C_5+$ gasoline | $C_5C_6$ | $C_7+$ gasoline |
| °API | 31.9 | 32.2 | 59.6 | 88.3 | 53.7 |
| I.b.p., °F. | 450 | 260 | 128 | 82 | 190 |
| 50% | 585 | 580 | 245 | 110 | 279 |
| 90% | 638 | 630 | 357 | 141 | 341 |
| EP | 666 | 679 | 423 | 234 | 400 |
| Total $N_2$, p.p.m. | 647 | 800 | 0.07 | | |
| Total sulfur, p.p.m. | 2,800 | 3,000 | <1 | | |
| Aromatics | 20 | | 12 | | |
| Naphthenes | | | 40 | | |
| Octane F-1 + 3 ml. | | | *85.8 | 100 | 79.0 |

*Octane on $C_7+$ gasoline = 79.8
†Not corrected for gasoline in charge.

**Table 2—Comparison of pilot-plant and commercial yields**

| | Pilot plant | | Commercial plant | | |
|---|---|---|---|---|---|
| | Vol.-% | Wt.-% | Vol.-% | Wt.-% | B.p.s.d |
| Charge | | | | | |
| Diesel oil | 100.0 | 100.0 | 100.0 | 100.0 | 1,597 |
| Hydrogen | .... | 3.1 | .... | *2.5 | .... |
| Total | 100.0 | 103.1 | 100.0 | 102.5 | .... |
| Products | | | | | |
| $H_2$ | | 0.26 | | | |
| $H_2S$ | | 0.15 | | | |
| $C_1$-$C_2$-$C_3$ | | 3.39 | | | |
| Total $C_3$ and lighter | | 3.80 | | †6.1 | |
| $iC_4$ | 13.2 | 8.95 | | | |
| $nC_4$ | 4.9 | 3.42 | | | |
| Total $C_4$ | 18.1 | 12.37 | 16.1 | 11.0 | 257 |
| $iC_5$ | 13.2 | 9.80 | | | |
| $nC_5$ | 1.4 | 1.13 | | | |
| $C_6$ | 17.0 | 14.00 | | | |
| Total $C_5$-$C_6$ | 31.6 | 24.93 | 33.9 | 26.1 | 541 |
| $C_7$+ gasoline | 67.0 | 62.00 | 67.9 | 59.3 | 1,085 |
| Total | 116.7 | 103.10 | 117.9 | 102.5 | 1,883 |

*Estimated
†By difference—includes loss.

**Table 3—Pilot-plant processing of vacuum gas oil, properties of products**

| | $C_7$-390° product | Diesel oil |
|---|---|---|
| °API | 51.8 | 40.0 |
| Engler distillation | | |
| I.b.p., °F. | 225 | 415 |
| 10% | 245 | 439 |
| 50% | 286 | 470 |
| 90% | 357 | 530 |
| E.p. | 400 | 554 |
| Total nitrogen, p.p.m. | | <1 |
| Total sulfur, p.p.m. | | <1 |
| Pour point | | <−30° F. |
| Lumnosity no. | | 48 |
| Cetane no. | | 49.3 |
| Aniline point, °F. | | 154 |
| Smoke point | | 23.8 |
| Aromatics, Vol.-% | 12 | 18.0 |
| Naphthenes, Vol.-% | 50 | 82.0 |
| Paraffins, Vol.-% | 38 | |

back and forth between refinery facilities.

In this example we are processing 10,000 bbl. per day of No. 2 fuel oil. Charge consists of 50% virgin distillate and 50% catalytic cycle oil. With the addition of a hydrogen generator and a catalytic reformer, the three units are completely self-contained. The 10,000 bbl. per day of No. 2 fuel oil will yield 9,884 bbl. per day of 101 octane 10-lb.-R.v.p. gasoline plus 1,260 bbl. per day of excess isobutane.

**Table 4—Pilot-plant processing of vacuum gas oil over-all yields including platforming to 100-o.n. gasoline**

| | S.c.f./bbl. | Vol.-% |
|---|---|---|
| $C_1$-$C_3$ | 215 | |
| $C_4$ after 10-lb. R.v.p. gasoline | | 10.4 |
| 10-lb. R.v.p. gasoline | | 73.5 |
| Light diesel oil | | 32.5 |
| | | 116.4 |
| Gasoline properties | | |
| R.v.p., lbs. | 10 | |
| Octane, F-1 clear | 92.5 | |
| Octane, F-1 + 3 ml. | 100.0 | |

**Table 5—Lomaxing 400°+ condensate to maximum gasoline**

Charge stock
42.8° API condensate 400°-700° F. boiling range

| Yields | Wt.-% | Vol.-% |
|---|---|---|
| $H_2$ consumed | −2.4 | .... |
| $C_3$ and lighter | 3.9 | .... |
| $C_4$ | 11.8 | 16.8 |
| $C_5$-180° F. | 23.7 | 29.2 |
| 180°-400° F. | 63.0 | 67.1 |
| Total | 102.4 | 113.1 |

| Product properties | Light product | Heavy product |
|---|---|---|
| °API | 81.3 | 53.2 |
| Paraffins, vol.-% | .... | 50 |
| Naphthenes, vol.-% | .... | 40 |
| Aromatics, vol.-% | .... | 10 |
| Octane, F-1 clear | 83 | .... |
| F-1+3 ml. | 98 | .... |

Total process investment for this combination of units is $7,500,000. This includes $1.7 million for a 13-M.M.c.f.d. hydrogen unit, a 10,000-bbl. hydrocracker at $4,000,000, and $1.8 million for a 7,500-bbl. reformer. The combination will pay out in 2.7 years after taxes—assuming operating costs at $9,195 per calendar day. The operating-cost figure includes direct operating costs for hydrogen production at 21.6 cents per M.s.c.f.d.; Lomax at 41.9 cents per barrel, and reforming at 29.2 cents per barrel.

If the differential between No. 2 fuel-oil charge and 101-octane-gasoline product is 5 cents, the payout is 2.7 years; the payout drops to 2 years with a 6.5-cent differential.

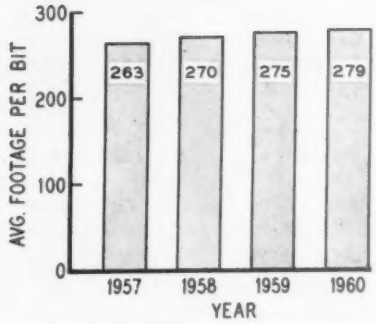

Next week:

## What's going on in Washington?

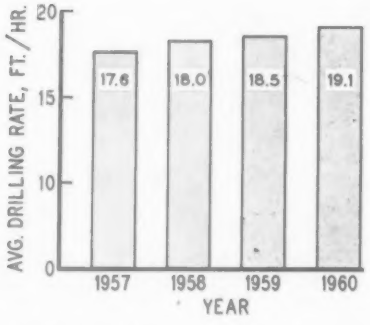
BEING WELL-INFORMED on governmental activities is vital. That's why The Oil and Gas Journal has prepared a special 14-page "Oil Man's Guide to Washington" for the November 13 issue. Here you will find:

- An analysis of the oil climate in Congress, the administration, and the courts.
- Key governmental actions in 1961.
- The big problems ahead.
- A rundown on all agencies and committees dealing with oil and gas.
- Can you afford NOT to keep abreast of events in Washington? Read about it in next week's Journal.

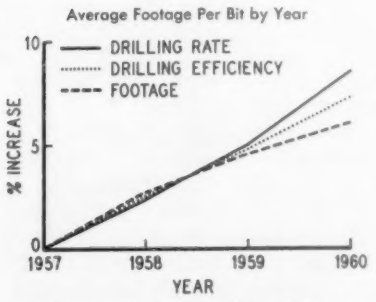
# Bit records show progress in drilling



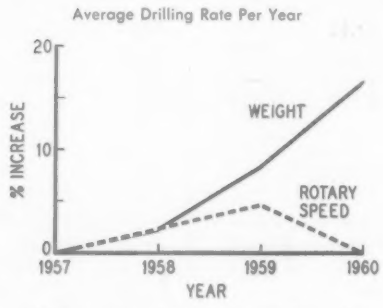

(a) Average footage per bit by year.



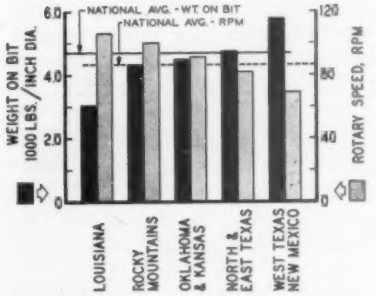

(b) Average drilling rate per year.



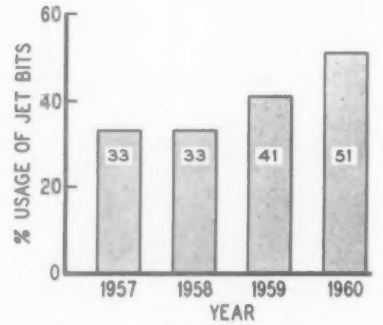

(c) Percentage increase in drilling rate, footage, and efficiency, by year.



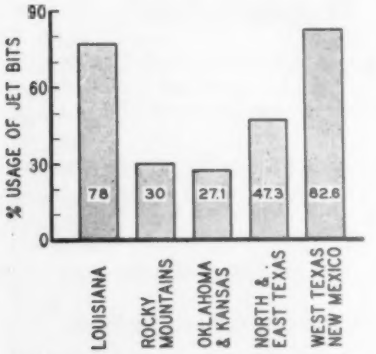

(d) Percentage increase in weight and rotary speed by year.




(e) Weight and rotary-speed practice by area during 1960.




(f) Per cent usage of jet bits by year.




(g) Per cent usage of jet bits by area during 1960.

**TRENDS** in milled-tooth bits for the continental United States shows steady climb in drilling efficiency, mostly as a result of higher bit weights. Use of jet-type bits increases, with greatest use in soft-rock areas of South Louisiana and hard-rock areas of West Texas and New Mexico. Fig. 1.

EVERY PHASE of rotary drilling has been studied in the last few years with the idea of drilling more hole for fewer dollars.

Result has been some definite changes in drilling practices and equipment. Here is how these changes compare in toothed bits for the years 1957 through 1960:

1. Drilling efficiency (bit footage and drilling rate) has improved about 2½% per year.
2. Weight on bit has increased steadily with average weight during 1960 16.4% higher than in 1957. The higher weight is probably responsible for the increase in drilling efficiency.
3. Rotary speed has remained essentially constant.
4. During 1957, only 33% of milled-tooth bits were jets; by 1960, 51% were jets.
5. Jet bits are most popular in two areas—Louisiana, a fast-drilling area, and West Texas, a hard-rock area.

During the same period, these trends developed in use of carbide-insert bits:

1. Proportion of carbide bits has steadily increased from 1.0% of total in 1957 to 2.9% in 1960.
2. Footage per bit and drilling rate have increased yearly.
3. Weight on carbide bits has not changed much except for an abrupt increase in air-and-gas-drilled holes in 1960.
4. Rotary speeds have remained essentially unchanged.
5. Use of sealed-bearing bits has increased carbide-bit footage 49% and rotating hours by 43%.

Most of the statistical data used in this article come from more than 820,000 bit runs of rolling-cutter rock bits, of Hughes manufacture, used in the Continental United States during 1957 to 1960 inclusive. The bits were the popular sizes, 6-in. through 12¼-in. When there was no information available for an area for any one year, we did not include data for that area for any other year.

Presented at 1961 annual meeting of American Association of Oilwell Drilling Contractors, Houston, under title, "Rotary Drilling Trends."

# more hole for fewer dollars

BY L. L. PAYNE, H. B. WOODS, AND R. S. GRANT,
Hughes Tool Co., Houston

**Editor's note:** Never before has it been possible to say with certainty what progress rotary drillers are making in reducing drilling costs. Now, the authors' company has accumulated on accounting machines all the current records of its bits run in the field. As a result of the machines' speed, great masses of bit records can be analyzed quickly. The figures such analysis reveals point clearly where we've been and where we're going in rotary drilling.

Thus, we believe the data here show the trends quite accurately.

### Toothed Bits

Fig. 1 accumulates the trends in footage, drilling rate, and efficiency for the conventional steel-toothed bits. Footage per bit (Fig. 1a) increased from 263 in 1957 to 279 in 1960. In the same period, drilling rate (Fig. 1b) rose from 17.6 ft. per hour to 19.1.

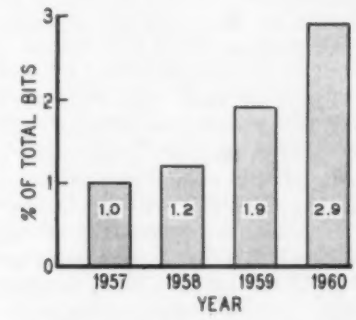
Cost per foot of a rock-bit run depends on both footage and drilling rate. An increase in either cuts drilling cost but not always to the same extent. Exact effect depends on drilling time, rig cost, round-trip time, etc. However, for an over-all average, it is fair to assume that they are equally insignificant and that increase in drilling efficiency is roughly equal to the average of the increase in drilling rate and the increase in footage.

In Fig. 1c, we have the percentage increase in footage, the percentage increase in drilling rate, and a third curve labeled "Drilling Efficiency." This third curve is merely the average of the other two. During this period, drilling rate has increased 8.5% and footage per bit 6.1%. Result is a 7.3% increase in "drilling efficiency."

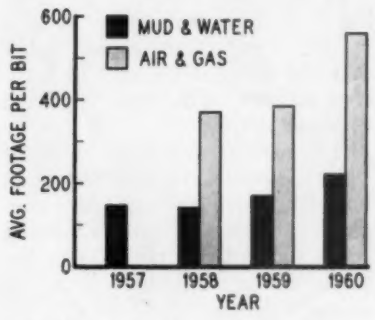
**Weight, rotary speed.** During the survey period, an important change in operations is the large increase in weight. This increase was fairly general throughout the 4-year period (Fig. 1d). Average weight on bit during 1960 is 16.4% higher than in 1957.

The trend to higher weights covers all parts of the country. However, rotary speed remained essentially constant. We believe that the use of higher weights is partially responsible for the increase in drilling efficiency.

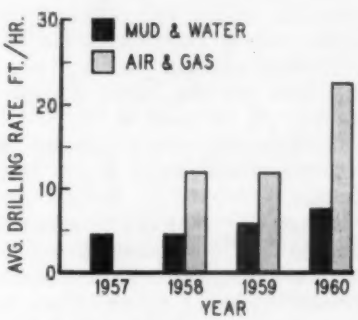
The most economical weight and rotary speed depend largely on the formation, mud, depth of hole, rig cost per hour, and hydraulics at the bit. For this reason, you wouldn't expect the most economical practices to be identical throughout the country. And, Fig. 1e does show that average weight per inch of bit



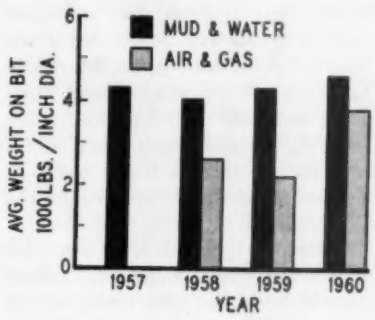

(a) Per cent usage of carbide bits by year.



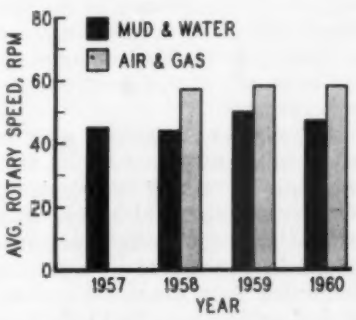

(b) Average footage per bit by year.



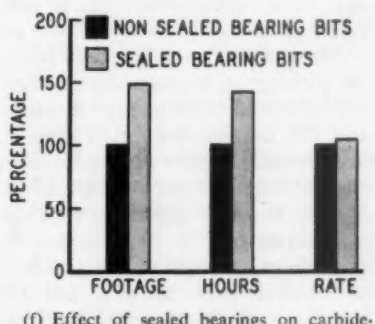

(c) Average drilling rate by year.




(d) Average weight on bit by year.

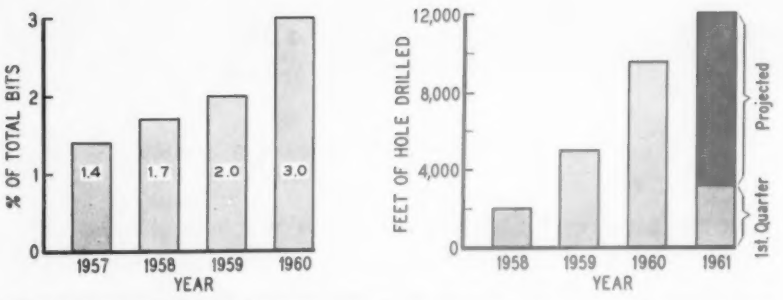



(e) Average rotary speed by year.




(f) Effect of sealed bearings on carbide-bit performance.

**CARBIDE BITS** have shown growing use from 1957-60. Weight and rotary speed have not changed in mud drilling as they did with tooth-type bits. Notice the big increases in footage and hours registered by the sealed-bearing insert-type bits. Fig. 2.




**INCREASE IN BIG-HOLE DRILLING** reflects increasing awareness of mining and construction industries that oil-well-drilling tools are efficient means of sinking shafts. Two main problems in drilling large-diameter holes are in providing enough weight on bit and in removing cuttings from the annulus where rising velocity is low. Fig. 3.

diameter in 1960 was different in different areas. Rotary speeds also varied over the country.

In areas where most of the drilling is in softer formations, weights are lower and rotary speeds higher than the national average. In hard-rock country, on the other hand, the opposite is true.

The national trend in the last 4 years has been to increase weight on bit while holding rotary speed constant. This does not necessarily mean that all one need do to improve drilling efficiency is to increase weight.

For each formation drilled, there is an optimum weight and rotary speed. We believe that improved technology in the years ahead will help pinpoint these optimum values. Our theoretical work along these lines indicates that in most cases, both weight and rotary speed should increase as the bit dulls. Such increases offset the slower drilling rate of a dull bit.

Moreover, in the harder and more abrasive formation, weights should be higher and rotary speeds slower. Thus, the theoretical work justifies the variations in weights and rotary speeds used in the different areas.

Most of our work has been based on picking an average abrasiveness for all the formations drilled during the life of any one bit. Doing so seems unreasonable when a bit must drill alternate layers of sand which is very abrasive and shale which is not abrasive. For this reason, we have been attempting, by the help of electric logs, to pick out the streaks of sand and shale. Then, we attempt to vary weight and rotary speed by a program based on two things: (1) the calculated dullness of the bit at any moment during its life; and (2) the abrasiveness and drillability of the formation, at the bit at that moment. This procedure requires concentrated individual attention to each well but it shows great promise.

**Effect of mud.** Recently, there has been research on drilling muds to speed drilling rate. This research is in part responsible for the better drilling efficiency we discussed.

The aim is to design a drilling fluid which drills as fast as "clear water." At the same time, the fluid must provide better cuttings for samples and better stability of the hole. When the content of solids goes up, drilling rate slows down. Solids content can be kept low by:

1. Substituting organic colloid materials for the clays normally used to gel the mud.

2. Removing fine cuttings by centrifugal separations or by flocculants.

Another approach to speeding drilling rate is to add surfactants to the low-solids muds. These surface-tension-reducing agents are intended to promote release of chips on the bottom of the hole and to improve cleaning action of the mud there. There have been big increases in drilling speed after adding as little as 5 gal. of detergent per 100 bbl. of mud.

In weighted muds, care must be taken with mud properties lest drilling rate be slowed unnecessarily. Weight must be held as low as is safe. Under such conditions, flow properties of the mud are especially important. Flow properties are controlled by dispersion and by the nature and quality of solids present. Dispersion, in turn, is controlled in "inhibitive" muds by the chemical action of salts, chrome-lignosulfonate deflocculants, or surfactants.

Nature and quantity of the solids can be controlled by centrifugal separators. These machines remove drilled solids and return the barite to the mud.

If the mud keeps a low plastic viscosity and low yield point for its weight, hydraulics will be best and drilling rate fastest.

**Jet bits expand.** We feel that part of the higher drilling efficiency has been a result of use of more jet bits. During 1957, only 33% of all milled-tooth rock bits were jets; the remainder had conventional water courses. By 1960, jet-bit usage (Fig. 1f) had increased to 51%. Actually, this usage is still increasing.

Probably the biggest factor in this increase has been the emphasis on better hydraulics. In searching for ways to get more power to the bit, contractors have found that cuttings can be effectively removed at lower annular velocities than previously used. As a result, less energy is required to pump the mud through drill pipe and annulus. More hydraulic horsepower is available to clean the bottom of the hole.

Better bottom-hole cleaning means better bit performance.

Theoretically, to get maximum power at the bit, the best combination is to use:

1. The liner that will just give the required annular velocity at the maximum rated pump speed, and

2. At any depth, the bit nozzles of a size that result in pump pressure equal but not exceeding the manufacturer's rating.

From a practical standpoint, there are always complications. There may be no liner like the theoretically correct size. Pressure limit on the rig may be lower than the manufacturer's limit. Or, the pump may not be able to stroke as needed for the best program.

We are working on a simple, direct procedure by which the most efficient hydraulics program may be prepared even though the above limitations apply.

Fig. 1g shows usage of jet bits during 1960 for different areas. Note that jet bits have their greatest popularity in South Louisiana, a soft-formation area, and in West Texas and New Mexico, a hard-formation area.

**Air and gas drilling.** Popularity of air and gas as oil-well circulating fluids has increased. Where these fluids can be used, drilling rate multiplies and bit footage jumps. Big reason for these increases is the reduction of fluid-column pressure in the well bore. Also, bearing life is longer in air or gas drilling.

We have not compiled statistics for air and gas drilling for toothed bits but such statistics for tungsten-carbide insert bits are discussed later.

Among the advances in air and gas drilling has been the percussion drill. Although this tool is still not fully evaluated, it appears to be a good substitute for weight on bit. Conventional rock bits with strengthened bodies have been developed to withstand the impact loads caused by the percussion tool.

### Carbide Bits

Carbide bits were introduced in 1951, and are still in development from the standpoint of design, operation, and locating formations which drill economically with this type of bit. When first introduced, the carbide bits were used for extremely hard and abrasive formations such as the chert sections of West Texas and the quartzitic sections of Oklahoma and the Rocky Mountains. Later, drillers found the carbide bits could economically drill other formations such as hard dolomitic lime and some of the softer limestones, sandstones, and laminated shales.

Fig. 2a shows that carbide bits have almost trebled in use, going from 1.0% of the total in 1957 to 2.9% in 1960.

In Figs. 2b and 2c, you can see the steady increase in both footage and drilling rate when drilling both in mud and in air or gas. Note also how much higher drilling rate is with air and gas compared to mud and water. Actually, in 1960, 156% more footage was drilled per bit with air and gas at a 200% higher rate than with mud and water.

With mud and water, footage increased 54% and drilling rate 72% from 1957 to 1960. With air and gas drilling footage increased 51% and drilling rate 87% from 1958 to 1960.

Figs. 2d and 2e show weight and rotary speed during the period. The only significant trend is the abrupt increase in weight in 1960 for bits used with air or gas. This increase brought the air and gas weights almost up to the level of those with mud and water. This increase with air and gas also accounts, at least partially, for the longer footage per bit and faster drilling rate during 1960.

**Where to use carbide bits.** Operating practices with carbide bits used with mud or water changed little in the survey period. Thus, the better performance of these bits must stem from other factors. One such factor was the diligent effort to locate formations that can be economically drilled with carbide bits.

During the period, the industry did, in fact, extend carbide-bit usage to many new formations, some previously thought too soft to drill with carbide bits. The increased versatility of the carbide bits can be attributed to several things:

1. Introduction of special designs for softer and harder formations.
2. Better drilling fluids.
3. Wider use of jet bits.
4. More frequent use of water as a circulating fluid.
5. Better drilling practice.
6. Willingness of the industry to experiment and look for new type formations to drill with carbide bits.

Today, in some formations in West Texas, it is economical to drill with carbide bits in clear water although a milled-tooth bit would make as much as 400 ft. in the same formation. Eight or nine years ago, we felt that if a toothed bit made as much as 30 ft. of hole, there was little use trying a carbide bit.

Sealed-bearing design has also extended life of the carbide bits. This is particularly true in the softer formations where the cutting structure outlasts the bearings. Sealed bearings are an important factor in the increased footage per bit during 1960. Fig. 2f shows the effect of the sealed bearings on carbide-bit performance. Rotating hours increased 43% and footage per bit 49%.

The number of rock bits or rock-bit cutters used in applications other than in oil-well drilling is relatively small. But the percentage is steadily increasing. Fig. 3a shows relative usage of bit elements outside oil-well drilling more than doubled from 1957 to 1960.

Part of the cutters used in these outside applications were in drilling 44-in.-diameter and larger holes which were, or could have been, drilled by oil-well drilling contractors with existing rigs. In fact, oil-well drilling contractors have drilled more than 20,000 ft. of 44-in. and larger hole in the last 4 years. While this footage does not seem impressive by itself, it represents the same volume as 900,000 ft. of 7⅞-in. hole. Largest of these holes was 90-in. diameter and 710 ft. deep.

Most large-diameter holes are used for underground mine ventilation, escape, and access shafts. However, several have been drilled for the Atomic Energy Commission's underground testing program.

Fig. 3b shows the steady increase since 1958 in the footage of large-diameter holes drilled by oil-well drilling contractors. Rotary methods are faster and often cheaper in drilling shafts. As mining and construction industries become acquainted with this fact, rotary drilling of shafts replaces other methods.

Oil-well drilling contractors have drilled almost every type of rock in large-diameter holes. The rocks vary from the soft unconsolidated sediments and bentonitic shales in the Ambrosia Lake uranium district of New Mexico to the hard granite in Nevada and Maryland and the quartzitic sandstones of West Virginia.

Two important problems have arisen in drilling large-diameter holes in these widely varying formations. One problem is applying a load to the bit. Large-diameter drill collars are being used to provide this weight. The collars used successfully to date have been:

1. 40-in. steel cylinders filled with lead.
2. 48-in.-diameter steel cylinders filled with steel punchings.
3. 36-in.-diameter cylinders with 6-in. oil-field drill collars staged circumferentially about a 7¾-in. drill collar.

The 40-in.-diameter collar, for instance weighs 40,000 lb. Four such collars concentrate sufficient weight in a short length adjacent to the bit to drill smoothly with a 44-in.-diameter bit.

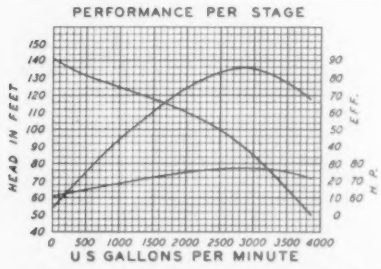
The second problem in drilling

# ▶▶▶ Why Johnston Verticals work so well in Waterfloods

**Versatility and flexibility are the two main reasons why Johnston vertical pumps work so well in waterfloods. For example:**

**For Raw Water Supply**

The vertical turbine was originally developed as a water supply pump so it is right at home in furnishing raw water requirements – regardless of the source. Here are some of its advantages: (1) It works well under both remote control and automatic operation because the bowls are submerged




TYPICAL JOHNSTON TURBINE PUMP
AT 1760 R.P.M. $N_s$ 3500

*Fig. 1*

and hence the pump is always primed; (2) A Johnston operates efficiently at variable heads without overloading the driver (from shut-off to full capacity) because of its steep head capacity curve and flat horsepower requirements (see Fig. 1); (3) It works equally well with any power source; (4) Johnstons are especially resistant to corrosion and abrasion because of vitriform enamel-lined bowls and other construction features.

**As a Pipeline Booster**

The features that make the pump good for raw water supply also apply to it as a pipeline booster, but it has these further advantages: (1) In-line piping connections permit more straight pipe runs; (2) Impellers can be trimmed or stages added to provide for new pumping conditions without changing the basic construction of the pump; (3) The pump can be pulled without unhooking any piping; (4) Replaceable bearings and wear rings simplify maintenance, while the packing box is readily accessible for easy adjustment.

**For Injection Supply**

This is where a Johnston really shines, because, above all, Johnstons are *flexible*. (1) Johnstons, for example, will give an almost unlimited range of power-capacity combinations in a system; (2) Pressures can go as high as 2500 psi with capacities

*Fig. 2*

ranging upward from 3,430 bbls. per day; (3) In most cases, multi-pump stations are used which, with the variations possible within each unit, make for unparalleled efficiency, as well as real operating economy. (See Fig. 2 for typical installation.)

Johnstons have been field proven by experienced operators in many successful waterfloods and we would be glad to give you data to indicate how they could also work well for you. Just call or write for more complete information or ask for an appointment with one of our trained field men.

**JOHNSTON PUMP COMPANY**

**Main Factory: Pasadena, Calif.,** 3272 E. Foothill Blvd.; Phone: MU 1-7601
**Factory Branches: New York 20, N.Y.,** 30 Rockefeller Plaza; Phone: PL 7-0431 • **Atlanta 1, Georgia,** 57 Forsyth St., N.W.; Phone: JA 3-7395 • **San Francisco 8, Calif.,** 260 Kearny St.; Phone: EX 2-0338 • **Roswell, N.M.,** 2007 S.E. Main; Phone: MA 2-5942 • **Pecos, Texas,** Balmorhea Highway; Phone: HI 5-3022 • **Idaho Falls, Idaho,** South Yellowstone Hwy.; Phone: JA 2-8144


large-diameter holes is getting sufficient rising velocity to remove cuttings. To date, oil-well drilling contractors have used conventional circulation to remove cuttings. Many large-diameter holes have been drilled with an annular rising velocity of 6-ft. per minute or less. With such low annular velocity, cuttings must be ground to small size for even a high-viscosity mud to carry them to the surface.

A centrifugal pump for handling abrasive materials was used to circulate mud while drilling the 90-in.-diameter hole mentioned above. It delivered 7,000 g.p.m. at 50-psi. discharge pressure. Annular velocity was about 20-ft. per minute.

Other methods of removing cuttings are being investigated. Air-lift, reverse circulation, and jet-eductor pumps are possible means.

Future for large-hole drilling using existing oil-well-drilling equipment is encouraging. Within the next few years, we expect to see 12 to 15-ft. diameter holes drilled with modified oil-well-drilling equipment.


**Acknowledgment**

The authors appreciate the assistance of Dr. George Gray, of Baroid Division-National Lead Co., on the section on drilling mud. They also appreciate the assistance of the staffs of the engineering departments of Hughes Tool Co.


## BOOKS

OIL IN THE MIDDLE EAST. By S. H. Longrigg. Published by Oxford University Press, 417 Fifth Avenue, New York 16. 401 pp. $5.60.

This book traces exhaustively the history of the development of oil in the Arab territories and Persia from the earliest times up to 1960, the major part naturally being devoted to the increasing exploratory and productive efforts of the past 50 years.

The study covers all the Middle East countries from Egypt to Persia and includes Cyprus and Turkey.

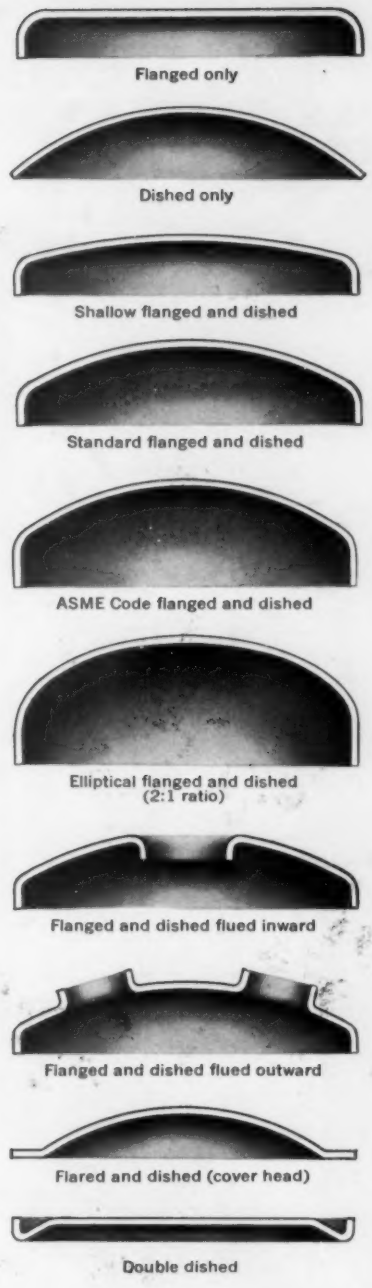
In the present volume the history of Middle East oil is carried down from mid-1953, where the previous edition broke off, to 1960.

Five new chapters have been added, on the chief producing countries, and the concluding chapter has been rewritten.

The maps are all new.

CHEM-PETRO GUIDE TO CANADA AND LATIN AMERICA. Published by Noyes Development Corp., 38 East 57th St., New York 22, N. Y. 64 pp. $12.

This guide describes the 500 leading chemical and petroleum firms in Canada and 18 countries of Latin America giving company names, street addresses, ownership, affiliated firms, plants, and products.

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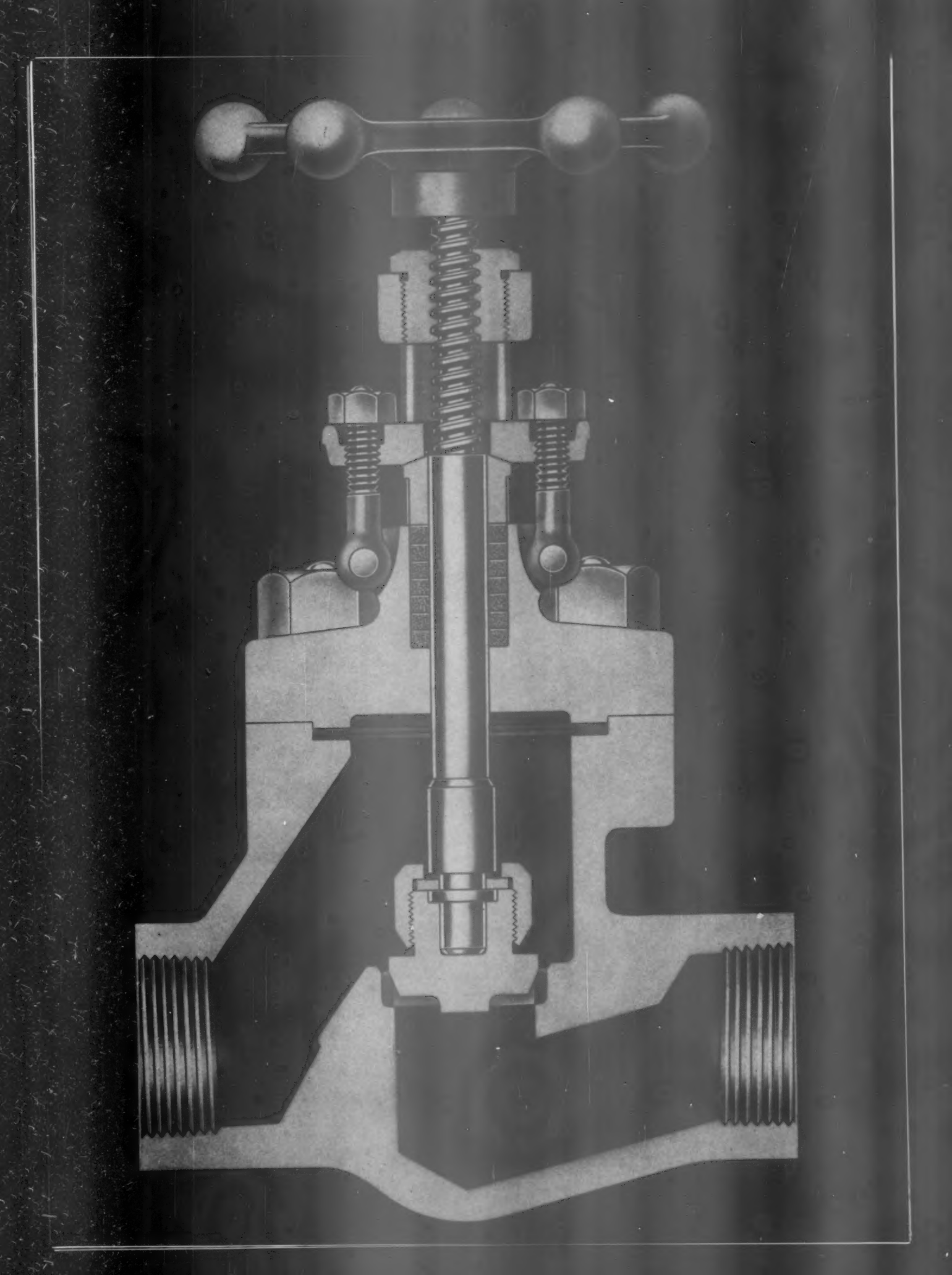

# You can tell a quality valve by the attention it doesn't need

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The valve illustrated at the left is the Hancock Type 5500 Steel Globe Valve widely used for all types of industrial plant services.

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*Europe: Manning, Maxwell & Moore, S.A., Fribourg, Switzerland*

1 Homemade casing splitter is used by Texas Eastern maintenance crews to cut casing in half for highway and railroad crossings. It is easier than hand cutting and cuts a straighter line.

5 Chains, drawn taut by jacks, are used to hold the halves of the casing in position for welding. A chain-grip from the side-boom in the center of the section helps in the positioning.

## PIPELINING NOTES

# Casing splitter eases crossing jobs

WHEN CONFRONTED with a new highway or railroad crossing on one of its existing lines, Texas Eastern Transmission Corp. generally cases the line though occasionally it may relocate it.

Casing is done in most instances because it usually costs less and it does not require cutting down throughput while the work is going on.

These are the steps Texas Eastern followed in casing a 30-in. line near Bay City, Tex., where a new railroad spur was under construction.

Preliminary steps include uncovering the line and cutting the casing in half. Most of the uncovering is done with a backhoe. The operator exerts particular care not to maneuver the shovel too close to the pipeline. The rest of the job is done by a maintenance crew which can reach areas not accessible to the backhoe.

Texas Eastern personnel has developed a simple device for cutting the casing in two. It makes the job of cutting easier.

It consists of nothing more than a base of metal set on four wheels with a chain-driven handle to one of the rear wheels. When the handle is turned the chain acts like that on a bicycle. The cutting torch is clamped to an attachment on the front of the metal base.

The wheels of the splitter are spaced far enough apart so that they straddle the curvature of the pipe. The effect is to keep the splitter on a straight line as the handle is turned.

The advantage of the casing splitter is obvious. It is easier to work with, since the hand of the man using a cutting torch gets tired when working on an extensive cutting job, and it cuts a straighter line than cutting by hand.

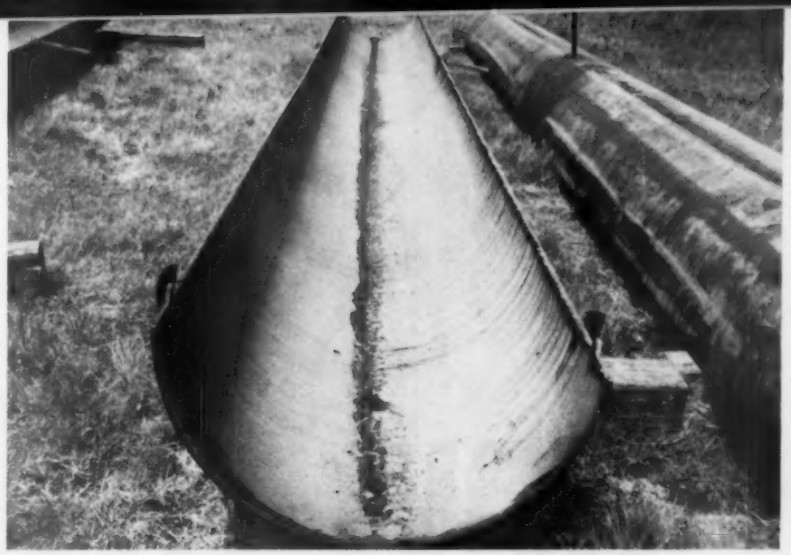
After the pipe is uncovered and the casing split, insulators or spacers

are installed at approximately 10-ft. intervals on the pipeline. These serve the dual purpose of centering the casing over the line and of controlling corrosion by preventing contact between the line and the casing.

The bottom half of the casing is then swung into position with a side-boom tractor. After the top half has been lowered into the ditch and positioned, chains, pulled taut by jacks, hold the casing in position.

The two halves are welded together, and, if more than one section of casing is used, the sections are joined with a circumferential weld.

Final step is the installation of vent at either end of the crossings.

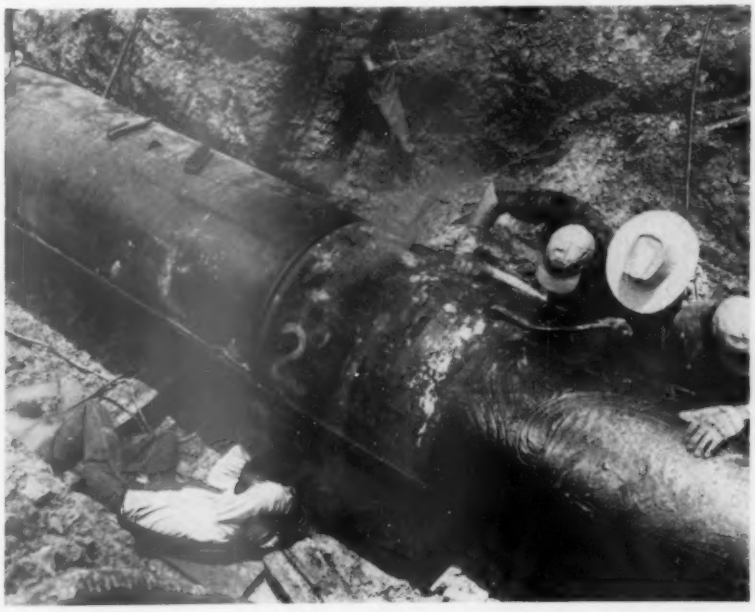


**2** This is 36-in. casing split for installation in a railroad crossing of a 30-in. line near Bay City, Tex. The halves are positioned and welded around the pipeline after it has been uncovered.

**3** After the line has been uncovered with a backhoe and by maintenance personnel, insulators or spacers are installed at approximately 10-ft. intervals before the bottom half is lowered in.

**4** Top half of casing follows bottom half into position. Like most pipeline-maintenance operations, this step requires close teamwork among crew members.

**6** The casing halves are longitudinally welded and, if there is more than one section, circumferentially. As the welding is completed, the casing is coated manually.



**7** A 4-in. vent on the Bay City crossing allows gas to escape if a leak develops at the crossing.

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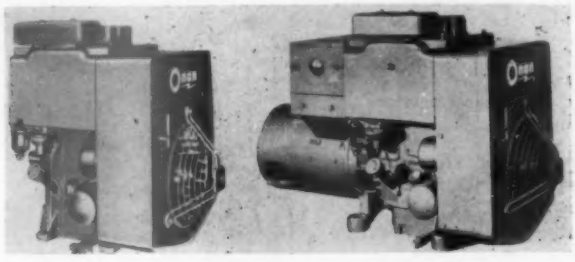
## Vehicle for road or rails

HYDRAULICALLY operated retractable rail guide wheels permit this carrier to travel on railroad tracks as well as over highways. According to the manufacturer, the vehicle is the first CCC road-rail carrier to use the hydraulic principle. Prior models have been mechanically operated. Source: **Crane Carrier Industries, Inc.,** 1150 N. Peoria, Tulsa.



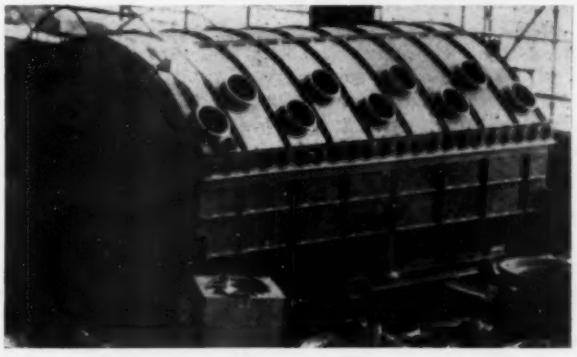
## New engines and generators

TWELVE ENGINES are available with generators to match in a new line recently put on the market. The engines are available in one, two, and four-cylinder water or air-cooled gas, gasoline, and diesel models.

Called the J-Series, the units are available in electrical ratings from 3 to 15 kw. and in engine ratings from 6 to 30 hp. Major features of the units include interchangeability of parts and accessibility of all parts for servicing from one side of an engine.

The engines and generators offer a means of electric and mechanical power for remote or standby service in the field or plant. Source: **Onan Div., Studebaker - Packard Corp.,** 2515 University Ave. Southeast, Minneapolis 14, Minn.

## New filter dewaxes oil



SHOWN HERE is a new dewaxing filter for refineries which operates continuously with the filtrate collected by the internal piping system and discharged through an automatic filtrate valve. Oil enters the filter combined with a solvent at a temperature of about 0° F.

The oil is filtered through a nylon filter cloth under vacuum on a rotating filter drum partially submerged in the solution of oil, solvent, and suspended wax crystals. This oil passes through the cloth. But the wax adheres to the surface where it is continuously washed by a chilled solvent. It is then dried by cold flue gas which passes through the filter cake into the vacuum system.

The filter measures 13 ft. 3¼ in. wide, 26 ft. long, and 13 ft. 6 in. high. It weighs about 60,000 lb. Source: **Eimco Corp.,** P. O. Box 300. Salt Lake City 4, Utah.

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## Transducer aids level measurement

A precision level transducer has been brought out that is designed to measure liquid level and convert it directly to an electrical resistance. The Model DLR instrument can be used to measure liquid level in open or pressure vessels.

It uses a frictionless magnetic coupling to transmit motion from level changes in the vessel to contact wiper movement on a potentionmeter winding inside the instrument housing. Primary level change

is sensed by a range displacer suspended in the liquid by means of an expansion spring. As the liquid level rises or falls, the effective weight of the displacer changes, causing the spring to extend.

Various length displacers are available to measure a wide range of level travels. The transducer can be used with resistance type of reading instruments for remote level indication, alarm, recording, or control. Source: **Magnetrol, Inc.,** 5300 Belmont Rd., Downers Grove, Ill.

●

## New tongs ease pipe handling

An automatic-release pipe tong has been developed which is expected to make pipe handling easier, safer, and faster than is possible with older methods. Pipe is released by the tongs when weight is slacked off. The tongs do not require anyone near them to manually release them.

They are ruggedly built to withstand hard service and come in sizes to handle pipe diameters from 3 to 36 in. Source: **C. A. Mathey Machine Works, Inc.,** P. O. Box 1159, Tulsa, Okla.

●

## Two-inch o.d. integral tubing joint

This 2-in. o.d. integral tubing joint with a 0.165-in. wall now available comes in seamless J-55 Range 2 with API round-thread form and is interchangeable with present 1½-in. API EUE and 2 1/16-in. integral joints. Joint efficiency is reported to be in excess of 100%. Source: **Atlas Bradford Co.,** P. O. Box 66669, Houston 6, Tex.

Practical ideas to help you Stop CORROSION

DETERMINING CURRENT REQUIREMENTS TO STOP CORROSION OF OIL WELL CASING

Would an experienced corrosion engineer make these mistakes in running current requirement tests for protection of a bare pipe line:

(1) **Use an electrically isolated lateral line as the ground bed?** The answer is, of course, "No." Current distribution along the line—the single most important factor in cathodic protection—is a function of the distance of the ground bed from the pipe line.

The same principle applies to the casing in oil and gas wells, because the casing is simply a vertical pipe line. The current required for external protection cannot be resolved by the Log Current-Potential method if the flow line—insulated off or disconnected at the well head—is used as the ground bed. This fallacy has been demonstrated many times by measuring the current pick-up along the casing with the down-the-hole potential-drop test.

If factual data is to be obtained, a temporary ground bed positioned the same distance out from the well as the permanent ground bed must be used.

(2) **Measure pipe-to-soil potentials with the reference half-cell located on the opposite side of other pipe lines?** Again, the answer is "No." Also, in running Log Current-Potential curves on wells, it is important that the half-cell have an unobstructed view of the well under test.

Your best assurance of obtaining factual information from current requirement surveys on wells is to call CSI engineers. They developed the surface instruments and techniques used to run Log Current-Potential curves which correlate best with down-the-hole potential-drop tests. They have almost a quarter of a century's experience in successful cathodic protection.

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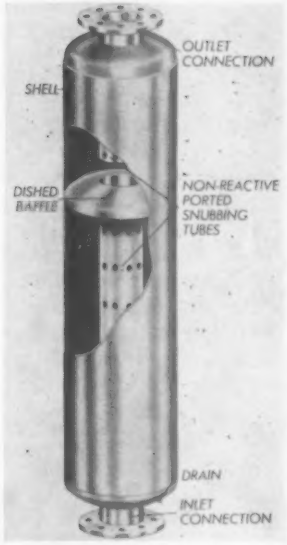



## Snubbers for turbocharged engines

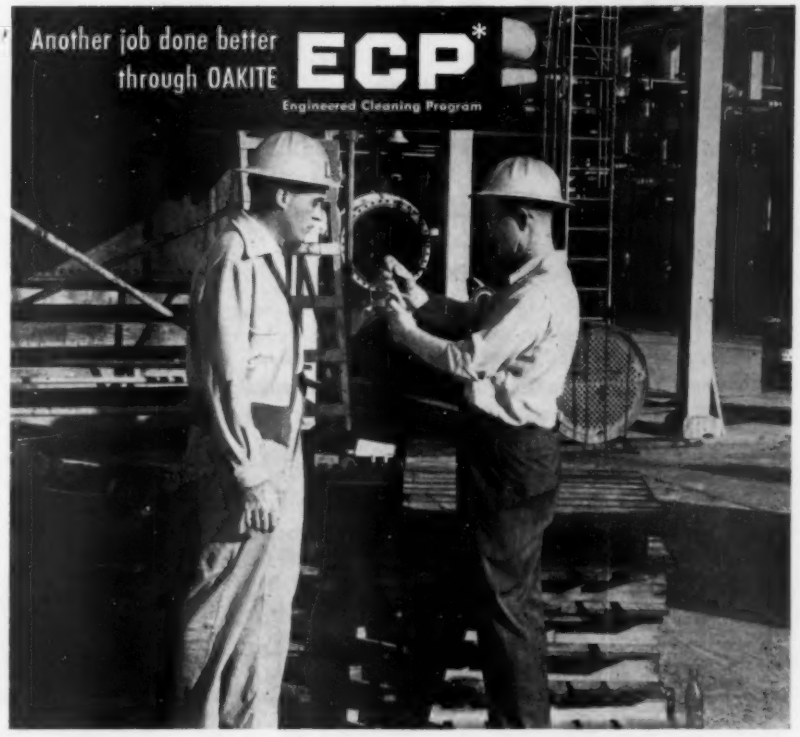
A new series of snubbers which operates on a straight-flow snubbing principle has been brought out for turbocharged engines. Each one of the series is designed for a particular level of noise suppression. They are available in sizes from 8 to 30 in.

In the snubbers, gas passes in a straight line through ported tubes and snubbing chambers and comes out in a quiet, smooth flow, the maker says. Source: **Burgess-Manning Co.,** 9207 Sovereign Row, Dallas 35, Tex.

●

## Separator-trap to take out water

Oil and water can be removed from compressed air, gas, and steam lines to assure delivery of high-purity fluid at the point of use with this new separator-trap system consisting of a T-type separator combined with a steam trap. The combination is claimed to be light weight and compact enough to be installed and supported in the line at any point. The separator and trap combined is designed to prevent moisture from getting by the trap alone. Components can be obtained for pressures from 150 to 1,000 psi. and for pipe sizes from ½ to 8 in. Source: **Wright-Austin Co.,** 3245 Wight, Detroit 7, Mich.


# Chemical cleaning speeds time-consuming turnarounds

Here are *some* of the results being achieved at various refineries when Oakite Engineered Cleaning Programs are put to work. They're typical.

A 90-foot tower cleaned in 15 hours . . . crude tower and heat exchanger purged to 99% cleanliness in 21 hours . . . partly plugged bundles saved from the scrap pile in just a few hours . . . 3½ days cut from previous record of cleaning an absorber . . . 5 days slashed from catalytic reformer turnaround time.

In each case, the procedure followed was outlined in the tower and tube bundle cleaning recommended by the ECP. The jobs being done utilize *chemical cleaning* . . . with the right material for each soil encountered. For example: Oakite 85 where carbon and iron oxides and sulfides must be removed; Oakite 77 for heavy oil, grease-laden soils and light rusts; Oakite Acalaid for supercharged cleaning power to remove abnormally stubborn soils.

In short, engineered cleaning programs not only offer you more efficient turnarounds, but also save time and money.

*Oakite ECP is a comprehensive cleaning program engineered to fit your particular operation under the experienced supervision of a local Oakite man. ECP covers every cleaning need. For details, write Oakite Products, Inc., 44C Rector Street, New York 6, N. Y.

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OAKITE ECP benefits you from the ground up . . .

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## multistage chlorine compressors prove their dependability

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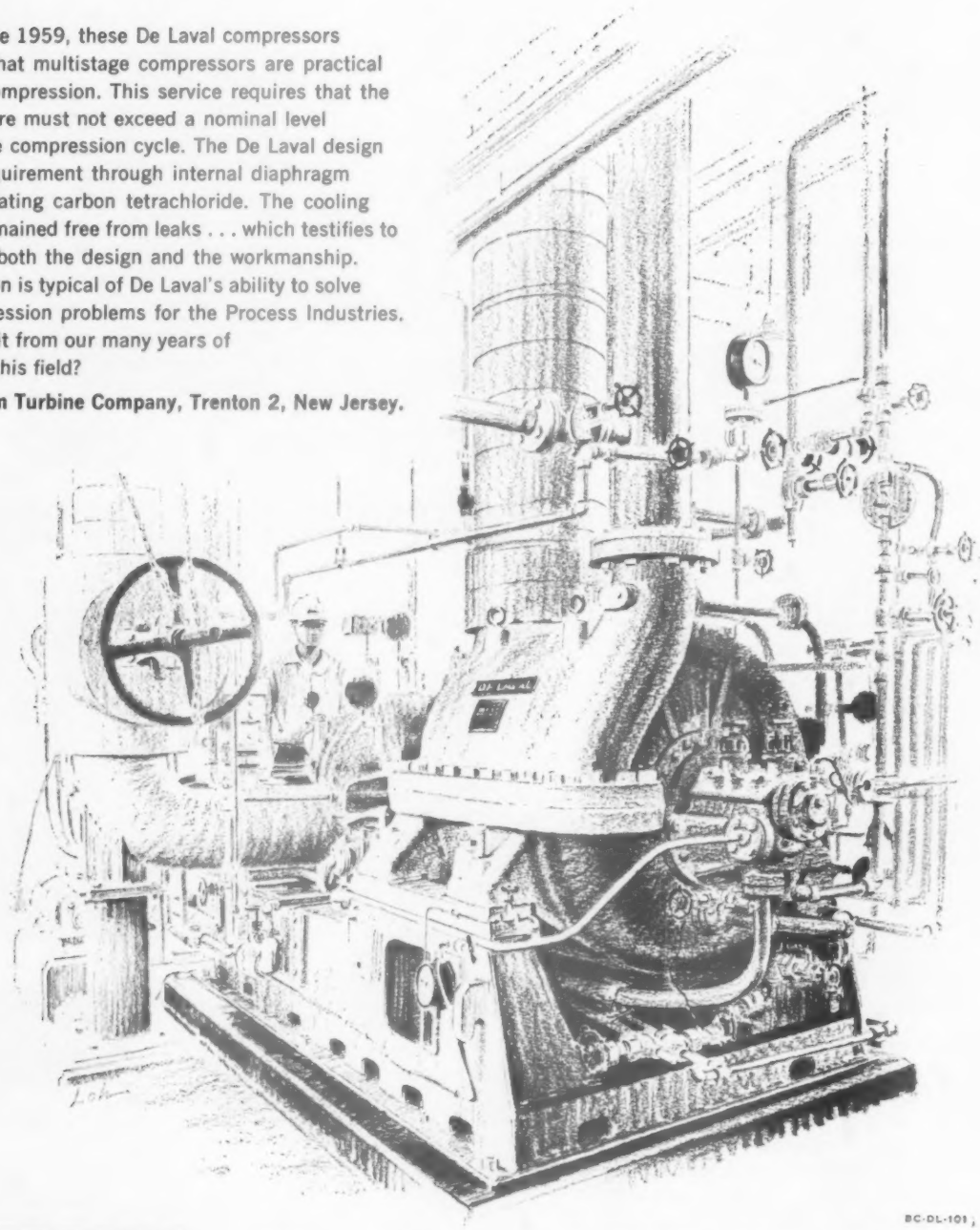
**De Laval Steam Turbine Company, Trenton 2, New Jersey.**



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## Aluminum pipe in 300-ft. coils

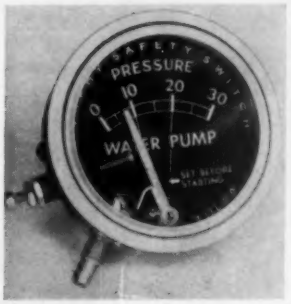
An aluminum underground pipeline system has been developed which should prove useful, particularly for connecting gas mains to consumers. The system requires no intermediate joints as it is fabricated in continuous 300-ft. coils, or longer. Coils in pipe sizes of ¾ and 1½ in. are now being produced.

The aluminum pipe is protected on the outside with a vinyl-butyl rubber laminate to prevent corrosion. Its interior is claimed to be smoother than that of steel pipe, providing an increase of over 8% in flow efficiency. Source: **Reynolds Metals Co.,** P. O. Box 2346-ZA, Richmond 18, Va.

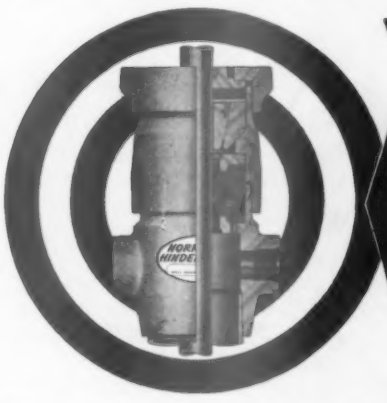
●

## Engine safety-switch gage

If low pressure develops on the discharge side of the cooling-water pump on an engine, a new safety-switch gage will shut the engine down to prevent damage. The new switch is designed for use on large engines that use a pump to circulate jacket cooling water and is available for pressure ranges from 0-to-to 0-to-160 psi. Source: **Frank W. Murphy Mfg. Inc.,** P. O. Box 4006, Tulsa, Okla.







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WRITE FOR NEW WELL HEAD BULLETIN
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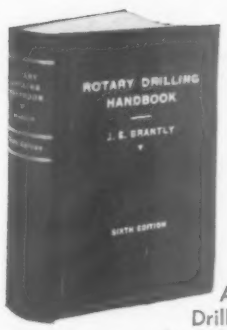
TUBING on CASING HEADS






## ROTARY DRILLING HANDBOOK

**SIXTH EDITION**

by J. E. Brantly, former president of Drilling and Exploration Co. and former president of the American Association of Oil Well Drilling Contractors. *1961, 840 pages, bound in fabricoid, $12.50.*

With the aid of more than 25 experts in various phases of the drilling industry Mr. Brantly has completely rewritten and greatly enlarged the Rotary Drilling Handbook which has been the standard reference work in this field for a quarter of a century. An appendix of 206 pages includes charts, formulas and tables to aid the driller and the engineer in solving perplexing problems.

CONTENTS

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Power Plants and Prime Movers
Circulating Pumps
Hoists
Rotary Machines
Drilling Feed Controls
Derrick Hanging Tools
Lubrication
Wire Lines
Drilling Shaft
Pipe and Depth Measurements
Bits
Drilling Fluid
Air and Gas Drilling
Weight on Bit and Rotating Speed
Balanced Rotary Drilling Practices
Instruments
Straight Hole Drilling
Directional Drilling
Fishing
Formation Testing
Casing and Hole Sizes and Well Programs
Casing and Casing Accessories
Cementing
Casinghead Control Equipment
Hydraulics of Drilling Fluid
Safety Measures
Geology
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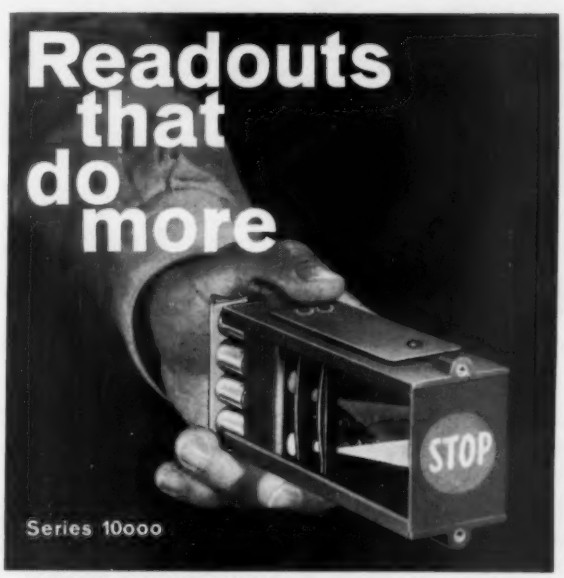
**Order from: The Oil and Gas Journal, Tulsa 1, Okla.**



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**INDUSTRIAL ELECTRONIC ENGINEERS, Inc.**
5528 Vineland Avenue, North Hollywood, California

# Ex Uno Plura

## (out of one, many)

From a single basic design, a complete engine line. That's GM Diesel's unique *family of engines concept.*

Pioneered in the thirties—and proven by over 90 million horsepower—it concentrates all GM Diesel's resources on the perfection of a *single basic cylinder design for all engines.*

What does this unique *family concept* mean to you?

It means you can meet every power need, from 20 to 1008 h.p., by using engines of just 2 different cylinder sizes—with up to *70% interchangeability of parts* between engines in each series.

It means *lower parts costs*—up to 50% less than for Diesels built in a flock of different designs and cylinder sizes. Lowest servicing costs, too.

It means you can *meet growing horsepower needs* (without loss of existing parts inventory or maintenance know-how) merely by stepping up to the next engine in the series.

It means that all the advances of the past, present and future can be applied to *every* GM Diesel—whether it's in equipment you've had for 20 years, or one that's just off the line.

It means *the ultimate in standardization benefits,* with greater profits per engine on every GM engine you add.

No wonder so many buyers of oil field equipment specify GM Diesel power. Ask for it in your next piece of equipment. Detroit Diesel Engine Division, General Motors, Detroit 28, Michigan. (In Canada: General Motors Diesel Limited, London, Ontario.)

# GM DIESEL

SERIES 53 & 71 ENGINES

**One proven design throughout the line builds greater value into every engine**

## TRADE LITERATURE

### Biocides bulletin

This two-page literature piece details biocides for the control of algae and slimes in industrial cooling waters. Following a brief discussion of the nature of algae and slimes, the literature tells how these substances cause damage to cooling-water systems. Included is information on two of the maker's products for control of the agents—Algaecide and Slimicide, along with data on their combined use. Source: **Western Chemical Co.,** 713 Washington St., Kansas City 5, Mo.

### New ethylene booklet

This 20-page booklet on ethylene has been prepared especially for developmental chemists and engineers using ethylene from cylinders. The booklet covers major chemical reactions of the ethylene molecule and gives extensive bibliographical references for further investigation of reactions involving ethylene's double bond. Physical properties of ethylene are given in both tabular and graphic forms. The literature presents a table of thermodynamic properties of liquid and saturated ethylene vapor. Source: **U. S. Industrial Chemicals Co.,** 99 Park Ave., New York 16, N. Y.

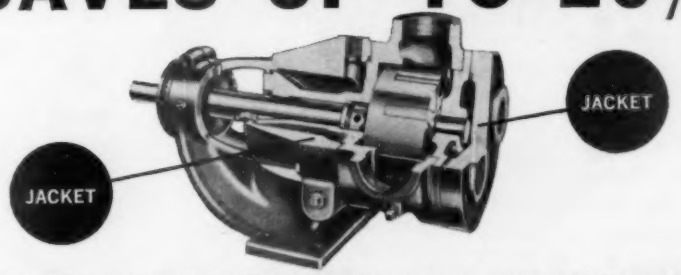
### Wellhead equipment

An eight-page technical bulletin on wellhead equipment for storage and disposal wells is now available free upon request. It discusses special problems of equipping storage and disposal wells and the resulting requirements for storage and disposal wellhead equipment. The bulletin describes typical storage and disposal well hookups, along with casing heads and hangers and tubing heads and hangers. Source: **Oil Center Tool Co.,** Box 3091, Houston, Tex.

### Way to blend fuel oil

This 36-page literature piece, accompanied by application and engineering data, features the Model 2070 two-component blender. According to the brochure, the blender is ideally suited to answer the need for positive control in delivering a uniform blend of fuel oil directly


NEW DESIGN
SAVES UP TO 20%




VIKING'S COMPLETE NEW LINE OF JACKETED STAINLESS STEEL* PUMPS

*Also other alloys—nickel, Monel, steel, Ni-Resist, etc.

Now you save money on *new* type stainless steel* Viking Pumps and still get that same rugged, heavy-duty service. The new, improved design makes it possible. All parts coming in contact with the material handled are stainless steel or other specified alloy—other parts are cast iron. Its unique design incorporates a jacket chamber around the back of the pump, around the mechanical seal or packing chambers and over the head of the pump. This chamber permits cooling or heating of the liquid being pumped.

Mounting dimensions remain the same as Viking's previous compact line of alloy heavy-duty pumps, and without increased size for jacketing.

Six sizes from 10 to 110 G.P.M. are available. Pumps operate at full speed handling light liquids—at reduced speeds for heavy, viscous liquids. Pumps suitable for pressures up to 50 P.S.I. handling non-lubricating liquids—100 P.S.I. on lubricating liquids. Completely self priming with positive discharge.

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50 YEARS

VIKING PUMP COMPANY

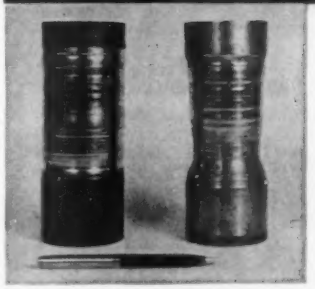
Cedar Falls, Iowa, U.S.A. In Canada, It's "Roto-King" Pumps

Offices and Distributors in Principal Cities • See Your Classified Telephone Directory

(See this new line of pumps at Viking's booth #1071, 28th Exposition of Chemical Industries, Coliseum, New York, N.Y., November 27-December 1. Pumps available in February.)

Mild Steel Outlasts Stainless!

*The Colmonoy Spraywelder applies powdered nickel-base alloys smoothly and quickly. Overlays are then fused and ground.*



*Left: mild steel sleeve with Colmonoy No. 6 overlay after 395 days service. Right: stainless steel (316) sleeve after only 105 days service.*

COLMONOY HARD SURFACING CUTS PUMP SLEEVE WEAR

Much longer wear and fewer packing changes are the results reported in using Colmonoy hard-surfaced mild steel pump sleeves in a Desalta charge pump where stainless steel sleeves were used before. Maintenance costs are now considerably lower. Compare the two pump sleeves in photo.

Colmonoy alloys and methods can protect your equipment, save you money. Write for the Spraywelder Catalog and the Colmonoy Hard-Surfacing Manual today.

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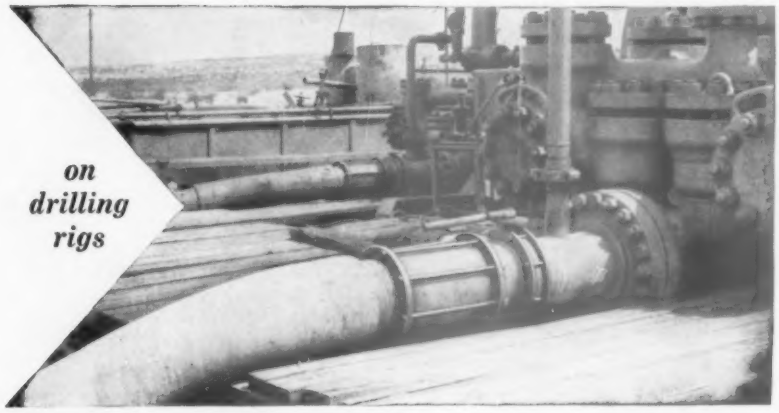


fast, vibration proof...

safe, permanent joints!

Dresser Couplings are easily installed . . . only two man-minutes per bolt with a simple hand wrench. The specially compounded Dresser Gasket provides the essential "give and take" to absorb vibration, settlement, and other stresses that might cause damage. It also allows up to 4° pipe deflection at every joint and still maintains a permanent, bottle-tight seal. Eases of take-down and re-usability of Dresser Couplings are a tremendous asset where you may need to add new pumps, valves or lines. Send for Dresser Catalog No. 531. It contains more detailed information and complete specifications on *all* Dresser Couplings, Fittings and Pipe Repair Products.

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DRESSER MANUFACTURING DIVISION

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into tank ducts, tank cars, ships, or storage. Included are illustrations, schematic diagrams, typical installation and flow diagrams, and blending data, as well as a description of the operation, uses, and advantages of the blender. Source: **B-I-F Industries, Inc.,** Box 276, Providence 1, R. I.

## Protection for motor windings

Solid-cast Everseal encapsulation for the protection of motor windings against severe environmental conditions, is featured in this eight-page brochure just released. The publication gives results of tests made on Everseal formulation and on completed solid-cast stators, showing the protection afforded against chemical fumes, heat and cold, dust, water splash, fog, salt spray, dust, abrasives, repeated and prolonged electrical surges, solvents, acids, caustics, and other conditions. The encapsulation is available on the windings of various types of motors with random-wound coils, up to 125 hp., 1,800 r.p.m. Source: **U. S. Electrical Motors, Inc.,** Box 2058 Terminal Annex, Los Angeles 54, Calif.

## Storage tanks of glass and steel

Obtainable free, this six-page folder discusses the uses and advantages of Glasteel Chemstor tanks for storing corrosive, purity-sensitive, and sticky materials. Bulletin 1012 notes that the new tank design increases the operating temperature range from 125° to 180° F. for sizes up to 10,000 gal. Included is data on tank advantages and physical specifications and design information on various-sized tanks. Source: **Pfaudler Co.,** 1135 West Ave., Rochester 11, N. Y.

## Thermocouple-assemblies price list

Available free upon request, this booklet outlines a simple step-by-step procedure for pricing complete mineral-insulated thermocouple assemblies including sheath, hot junctions, a selection of termination, and several types of mounting fittings. Photographs of these components are included. A price list is also shown for the Conax pipe-

clamp assembly, a unit designed to measure surface temperature of heavily insulated pipe. Source: **Conax Corp.**, 2300 Walden Ave., Buffalo 25, N. Y.

### Electric, gasoline, and diesel hoists

Just released, Bulletin 34A contains 20 pages of information on industrial hoists. Included are construction details, selection data, drum-cable capacity, hoist accessories, electric motors and controls, and air-operated units. Source: **Clyde Iron Works, Inc.**, Duluth 1, Minn.

### Liquid-level switches

Brochure SF-765, just issued, describes LevelAc liquid-level switches which employ stationary ceramic magnets, completely surrounding a sealing tube inside which a magnetic shunt moves in response to liquid-level fluctuations. Up to eight separate electrical circuits are possible from a single instrument. According to the 12-page literature piece, the stationary magnet arrangement permits all moving parts to be light in weight, thus reducing the possibility of damage from vibration. Source: **Fulton Sylphon Div., Robertshaw-Fulton Controls Co.**, Box 400, Knoxville 1, Tenn.

### Additive for drilling mud

Detailed in this four-page bulletin is Cellex, sodium carboxymethylcellulose in dry, free flowing, granular form, specially processed for use in drilling mud. The literature points out the product's advantages, recommended uses, and temperature tolerance. Source: **Baroid Div., National Lead Co.**, Box 1675, Houston 1, Tex.

### Locating grounds on live circuits

This new bulletin gives a clear picture of the latest scientific methods for locating ground faults on ungrounded electrical systems without power interruptions. Dangers and costs of faults are discussed. The 18-page bulletin makes use of diagrams, schemation, and photos to illustrate procedures and equipment used. Source: **Excel Electric Service Co.**, 2113 S. Western Ave., Chicago 8, Ill.


FACTS FOR REFINERS

INSTRUMENTATION FOR AUTOMATION

# Five Keys To More Profit

**• NEW PSD CONTINUOUS VISCOSIMETER Helps Refiners Make Present Equipment More Productive, Increase Yields, Upgrade Low-Value Stocks, Improve Quality, Cut Indirect Costs**

Accurate and automatic measurement of viscosity on process streams can significantly speed many refining operations, improve product quality and conserve blending materials. The PSD CONTINUOUS VISCOSIMETER* is accurate to 0.5% of scale over the viscosity range of 30—2500 SSU and temperatures from 100-210° F. For more viscous materials, such as asphalt, extended ranges of viscosity and temperature can be supplied.

The CONTINUOUS VISCOSIMETER is fully automatic, truly continuous, compatible with electronic controllers and designed for Class I, Group D, Division 1 installation.

## Major Profit Advantages

1. *Makes Present Equipment More Productive* . . . For crude-running units the PSD CONTINUOUS VISCOSIMETER keeps distillates *on specification* . . . resulting in more *usable* products. It continuously saves production time by getting units "lined-out" faster after changes in operations. For continuous blending and packaging operations, the instrument eliminates the production delays associated with laboratory testing and reporting.

2. *Helps Get Higher Yields* . . . For crude-running units the CONTINUOUS VISCOSIMETER provides more accurate control of distillate quality, reduces diversion of distillates to gas oil, increases utilization of crude for valuable products. For deasphalting and dewaxing processes, the instrument helps segregate products accurately—prevents degrading the value of end products. For packaging operations, continuous viscosity monitoring prevents the loss of final product due to contamination.

3. *Increases the Value of Low-Grade Stock* . . . In the blending of residual fuels the CONTINUOUS VISCOSIMETER helps you capitalize on maximum use of less-costly cycle stocks.

4. *Helps Make Better Quality Products* . . . For blending operations the PSD CONTINUOUS VISCOSIMETER maintains products consistently within specifications. Continuous viscosity measurements of laboratory accuracy reliably aid operators to eliminate peak and valley variations in quality.

5. *Reduces Indirect Costs* . . . In all refining operations the PSD CONTINUOUS VISCOSIMETER considerably reduces the need for reprocessing—through more accurate control at each refining step. It reduces the amount of storage capacity required. It speeds the release of product shipment through "on-the-spot" monitoring of product quality.

HOW IT WORKS . . . Sample is furnished continuously from the process line or vessel to the CONTINUOUS VISCOSIMETER, where it is brought to test temperature by flowing through a heat exchanger immersed in the constant temperature bath. Sample then passes through a pressure regulator to a constant-rate metering device that is also immersed in the bath. Under these conditions of constant volumetric rate and temperature, the pressure exerted by the sample at the entrance to the measuring capillary is proportional to the viscosity of the liquid. This pressure is sensed by a strain gauge having an accuracy of ±0.25%. The signal from the strain gauge is recorded in convenient viscosity units, either Saybolt Seconds or centistokes, as specified.

*Developed by Standard Oil Co. (Ind.)—manufactured under exclusive license by Precision Scientific Development Co.

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# EQUIPMENT MEN

## Michael F. Hazel is president of Oil Well Supply Division

M. F. Hazel

Hazel, previously executive vice president, succeeds Fred F. Murray, who retired October 31. Hazel joined Oil Well Supply in 1930 at the Imperial Works in Oil City, Pa. In 1932 he was transferred and spent the next 4½ years as service engineer in Kilgore and Conroe, Tex.

In 1937 Hazel was appointed sales manager of Oilwell's West Texas district and assistant division sales manager at Houston in 1942. Following a World War II tour of duty in the Navy, he returned to the division as assistant to vice president with headquarters at Dallas. In 1946 he was made assistant general manager of sales, and on January 1, 1948, was appointed general manager of sales.

Three years later Hazel was named director of engineering, and on January 1, 1955, became vice president of sales, the position he held until his appointment as executive vice president last January.

## Bernard M. Hartigan sets up new organization in Rome, Italy

Bernard H. Hartigan, formerly assistant to the vice president and general manager of American Independent Oil Co. in Kuwait, Arabian Gulf, has established. Hartigan Oil Services at Via Parigi 11, Rome, Italy. Hartigan is representing Italian and American manufacturers of drilling supplies and equipment, mud, and chemicals. He is engaged in personnel activities in Africa, the Middle East, and the Spanish Sahara.

## Colorado Fuel & Iron makes two tubular-sales appointments

W. W. Leonard has been appointed manager of tubular sales, and D. W. Kelly, assistant to Leonard, it was announced by R. L. Hanes, vice president in charge of sales for the western division of the corporation.

Leonard joined CF&I in 1952 as assistant manager of tubular sales. Earlier he worked for Continental Supply Co. and Youngstown Sheet & Tube Co. Kelly served in the tubular-sales department since 1955 as sales engineer for the Rocky Mountain area. He joined CF&I in 1953.

## OPW-Jordan Corp. is acquired by Richards Industries, Inc.

A new company, Richards Industries, Inc., has acquired Dover Corp.'s OPW-Jordan Division, Cincinnati manufacturer of regulator and control valves. Richards Industries is headed by Gilbert B. Richards, Jr., formerly president of OPW-Jordan Division of Dover.

Operations will be carried on as in the past, under the name of Jordan Valve Division of Richards Industries, Inc. The same personnel and sales representatives will continue with the company. The specialty valve products of the OPW Division of Dover, previously distributed by OPW-Jordan, will now be distributed by OPW, utilizing Jordan's same group of sales representatives.

## Hydro-Services, Inc. established to serve Gulf Coast territory

Specializing in high-pressure water blast cleaning, the firm will be located in Houston. G. W. Kisler, president, noted that demands in pipeline, refinery, chemical, and related industries led to the formation of Hydro-Services. Kisler was formerly sales manager for Zagst, Inc., Caterpillar engine dealer in Houston. Prior to that he served 19 years with General Electric as sales engineer for heavy industrial equipment.

## Vinson Supply Co. appoints B. J. Enlow to new position

B. J. Enlow

B. J. Enlow, formerly manager of Vinson Supply's Amarillo district, has been promoted to vice president — sales coordinating and planning, a newly created post. Enlow, whose new duties take him to the Tulsa headquarters, joined the firm in 1950. He was appointed manager of the Amarillo branch in 1955 after serving in various sales capacities.

Succeeding Enlow at Amarillo is Paul Bennett, of that office. He joined Vinson in 1955 after 10 years with Phillips Petroleum.

## Tenth division is established by Continental-Emsco Co.

The new area, which will be known as the eastern division, was formerly called the tri-state district and was composed of three states — Illinois, Kentucky, and Indiana. Now the area will include Indiana, Illinois, Ohio, Pennsylvania, West Virginia, Kentucky, Michigan, Wisconsin, eastern Missouri (including St. Louis), and northern Tennessee—extending south to Nashville.

Harry T. (Bud) Haugh, former tri-state district manager, has been named manager of the new Continental-Emsco division. Haugh, who will locate in the division headquarters at Evansville, Ind., has been in the area for 10 years and has handled various assignments with the company.

## Schlumberger acquires control of Solartron

Schlumberger Well Surveying Corp., a wholly owned subsidiary of Schlumberger, Ltd., both with headquarters in Houston, and Firth Cleveland, Ltd., of London, England, have agreed that Schlumberger Well Surveying Corp. will acquire Firth Cleveland's 56.7% holdings in

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# the only real drawout 2- to 5-kv controller...with a contactor you can get at, into, around...without tools

▲ This means no unbolting—no wires to unfasten. You rack the contactor to "disconnect position" with the door closed. Open door. Roll contactor carriage out. It's that simple, that quick . . . and safe. ● Inspection? Lift out arc chutes and barriers. Rotate pole pieces to fully expose contact structure. Fuses? Lift them out, too. No tools, all the way. ■ SPACEMAKER control. First dramatic new achievement in high-voltage motor control in more than a decade. To learn more about the many cost-cutting features, call your A-C distributor or representative. Or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

**LET'S COMPARE THESE FEATURES**

| | SpaceMaker Controller | Controller "A" | Controller "B" |
|---|---|---|---|
| Two starters in 90" height | Yes | No | No |
| Drawout construction | Complete | Partial | No |
| Simultaneously disconnects all six main leads (line and load) | Yes | Line Only | Line Only |
| Automatic shutters isolate line | Yes | Yes | No |
| "No-tool" inspection of contacts | Yes | No | No |
| Track-resistant, flame-retardant insulation | Yes | No | No |
| Contactor construction | Double Break | Single Break | Single Break |
| Overload relays visible from outside | Yes | No | No |

**ALLIS-CHALMERS**

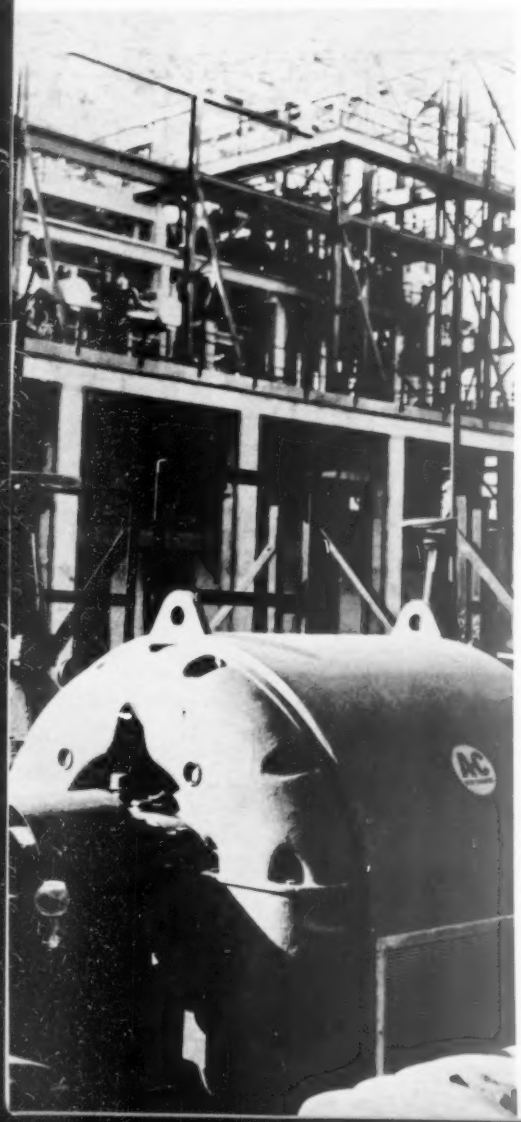
A-1521

# ideas and news

**Control centers simplify maintenance:** Allis-Chalmers low-voltage motor control centers have been designed with the maintenance man in mind. TRACK-GUIDE draw-out construction and plug-in terminal blocks simplify inspection—make it easy to remove units. Special bus connectors and heavy bus supports improve reliability.

**Load center substations cut costs:** You keep line losses at a minimum and obtain better regulation by locating substations close to your load centers. And you look ahead to load growth with Allis-Chalmers substations because they are pre-planned for expansion. You can cut initial costs and simplify your maintenance, too, by specifying A-C metal-enclosed switchgear and dry-type, oil-filled, or CHLOREXTOL-filled transformers.

**Open motor "weathers" the weather:** Sandstorms, snowstorms — even hurricanes — cannot affect the remarkable SILCO-FLEX insulation in SUPER-SEAL motors. This insulation is equally resistant to oil and most corrosive atmospheres. Refineries, pipelines and chemical plants are cutting initial costs and maintenance expenses by installing SUPER-SEAL motors. And, because they are open type, they have a 15% higher service factor than conventional TEFC units. You can get these motors in a hurry, too. Most squirrel-cage ratings between 150 and 3000 hp are available as Standard Pre-Designed motors. This means you get complete specifications immediately–delivery in 45 days or less.



## Which of these productive ideas could be working for you?

Control centers that simplify maintenance. Large motors with practically off-the-shelf delivery. These examples demonstrate the extra value that is standard with A-C . . . the greater efficiency and added productivity which are yours when you buy A-C products, systems and services. Call your A-C representative for details on A-C "worth-more" features. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

**ALLIS-CHALMERS PRODUCTS FOR THE PETROLEUM INDUSTRY:** Look to Allis-Chalmers for controls, rectifiers, switchgear, transformers, capacitors, circuit breakers, industrial systems, motors, pumps, compressors, valves, engine-generators, water conditioning equipment, thermal, hydro and atomic electrical generating equipment, earth-moving equipment, tractors, lift trucks. A-1566

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**ALLIS-CHALMERS**

Solartron Electronic Group, Ltd., for a cash consideration of $5,429,-272.

Solartron Electronic Group, Ltd., is engaged in electronics and instrumentation. Products include oscilloscopes, stabilized power supplies, digital counting equipment, analog computers, and data-handling equipment. Schlumberger, Ltd., provides electrical oil and gas-well measurement services and makes data acquisition, transmission, and reduction - systems equipment for the petroleum industry.

## McCullough Tool Co. makes three major personnel changes

Jim Edwards

Jim Edwards has been appointed coordinator—logging and radiological safety; Don Prehoda takes over as mountain division sales and service manager; and G. D. Wiley has been promoted to mountain division sales coordinator. Edwards joined McCullough in 1953. He has since served as logging engineer at Los

Don Prehoda

G. D. Wiley

Angeles, geologist and sales engineer in Denver, and sales manager of the mountain division.

Prehoda has been with McCullough for 12 years. Prior to this appointment he served in several capacities at the Los Angeles district, advancing from serviceman trainee through service unit operator, sales representative, assistant district service manager, and district manager. Since joining McCullough in 1954, Wiley has served as sales representative and assistant mountain division sales manager. He was previously employed by Baroid Sales Division in the well-logging department in the Mid-Continent and Rocky Mountain areas for 6 years.

## General Electric Co. promotes McGuckin to publicity post

The appointment of William J. McGuckin as manager of advertising and sales promotion for General Electric Co.'s computer department has been announced by Lacy W. Goostree, Jr., manager of marketing. In his new position, McGuckin will be responsible for planning and executing all national advertising, sales promotion, and publicity programs for the department's information-handling equipment. He succeeds Roy D. Jordan who is transferring to the department's marketing-training program as senior applications instructor.

## Frank Wheatley Pump & Valve to begin manufacture in Europe

Frank Wheatley Pump & Valve Mfr., of Tulsa, has completed setting up final stages of production on company valves by manufacturing plants in England, Scotland, Ireland, France, Italy, Norway, and Sweden. Preparations were made during a recent trip to Europe by three executives of the company—

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control scale problems

*with these Dowell products*

Most scale problems in oil and gas wells can be controlled with the Dowell products listed here. These products can help you increase production, hold down workover costs.

**BULK ACID**

Inhibited hydrochloric acid used to remove a variety of scales from formation faces, tubing and water or oil flow lines.

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Dowell acid in granular form. Add water and it's ready to use. Convenient where transportation or storage of bulk acid is a problem.

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Versene 100 chelating agent is used to remove difficult scale deposits, including calcium, magnesium and barium sulfate.

**GYPBAN***

Gypban, Dowell material used to prevent formation plugging by water-formed gyp deposits, is granular in form. It is injected into producing wells with water or fracturing materials. It is also used to maintain flow in injection wells by keeping scale deposits from forming in lines and in the well.

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PRODUCTS FOR THE OIL & GAS INDUSTRY

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DIVISION OF THE DOW CHEMICAL COMPANY

Frank Wheatley, Jr., president; and Huber Dye and Norman Haenky, representing Wheatley's manufacturing divisions.

### Dan M. Krausse to become v.p. at Dresser Industries

Dan M. Krausse, senior vice president of Cosden Petroleum Corp., will leave the corporation in mid-November to join Dresser Industries, Inc., in Dallas, as vice president. Krausse will be working with the Dresser companies related to oil and gas-drilling equipment and services. This group includes Guiberson Corp., Ideco, Inc., Lane-Wells Co., Magcobar, and Security Engineering.

### Bowen Itco, Inc. names two executives to v.p. positions

The board of directors elevated Z. C. Ambrose from general sales manager to vice president of sales, and G. Reid Hodgson from director of engineering and research to vice president of engineering, it was announced by Fred N. Osmun, Bowen Itco president.

Ambrose, who recently joined the firm as general sales manager, has had over 25 years of oil and gas-industry experience, going to Bowen Itco from Houston Oil Field Ma-

Z. C. Ambrose

G. R. Hodgson

terial Co., where he was executive vice president. He directs and administers all sales activities of the company's 21 domestic sales outlets and export sales agencies throughout the free world.

Prior to joining Bowen Itco in May 1960, Hodgson was director of engineering with Johnston Testers, Inc., and had been a project-development engineer for Schlumberger Well Surveying Corp. He has had more than 30 years experience in the petroleum-engineering field.

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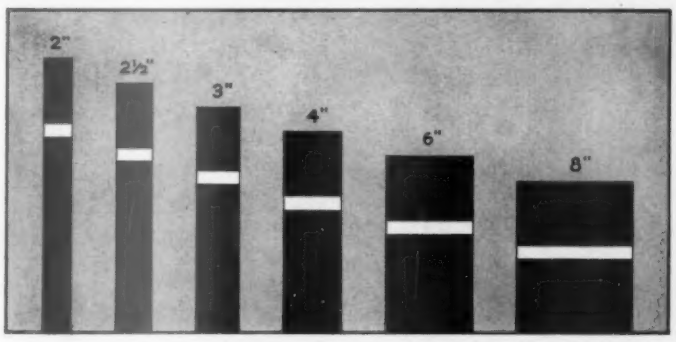
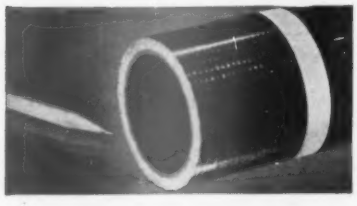



Choose from 6 sizes. Same operating temperature range . . . same operating pressure range . . . same corrosion resistance . . . NEW 6- and 8-inch sizes meet the growing demands of the processing industries.

# Now! A complete size range of Fibercast Epoxy Pipe—including new 6″ and 8″

- *handles a temperature range from −65° to +300° F.*
- *withstands an operating pressure range up to 1200 psi.*
- *pipe sizes from 2″ to 8″*

Only Fibercast, with its unique reinforced epoxy resin construction, can withstand sustained high pressures, high temperatures and extreme corrosive conditions more efficiently than any other pipe. Fibercast's ability to competently handle 320 of 338 corrosive solutions is on record. And now Fibercast, in answer to more of the needs of industry, brings its proven value to larger size flow lines.

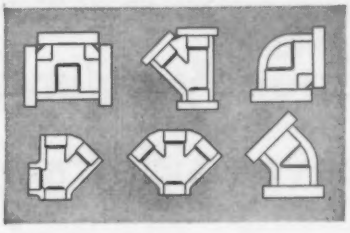


Fibercast Tube and Pipe, ranging in size from 2″ to 8″, is not subject to cold flow or permanent set. It is exceptionally easy to install, readily following ditch contours, saving many costly man-hours where other non-metallic pipes or coated metal pipes simply do not work effectively.

The operating collapse strength of Fibercast is another major factor in its wide-spread use. It has a proven capability of maintaining a collapse load of *twice* the rated collapse!* Moreover, Fibercast is much lighter than steel (less than ¼ its weight) and is correspondingly easier to handle, during both installation and maintenance.

**An additional safety factor is that Fibercast, with its seamless woven glass fiber construction, cannot burst.*

Fibercast Fittings, of course, are also available for the new sizes. They represent the world's most complete stock of standard sizes and types. And, as always, you can have couplings, or even complete piping systems, designed and made to order for your individual requirements.



Get the full story on Fibercast's cost-saving advantages to industry. Learn how it can help *you* solve *your* pipe and tube problems. Mail the coupon today.

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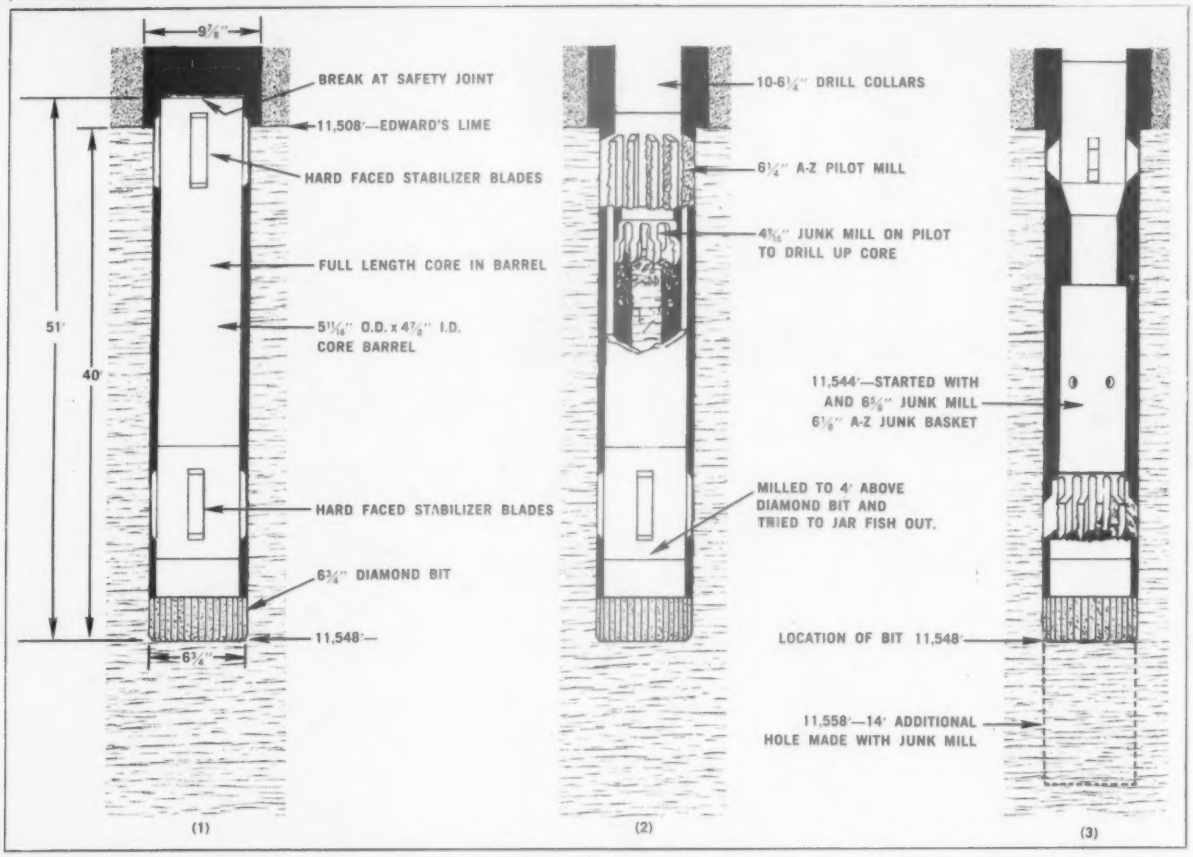

9⅞"
BREAK AT SAFETY JOINT
11,508'—EDWARD'S LIME
HARD FACED STABILIZER BLADES
FULL LENGTH CORE IN BARREL
5 11/16" O.D. x 4⅞" I.D. CORE BARREL
51'
40'
HARD FACED STABILIZER BLADES
6¾" DIAMOND BIT
11,548'—
6¾"
(1)
10-6¼" DRILL COLLARS
6¼" A-Z PILOT MILL
4 5/16" JUNK MILL ON PILOT TO DRILL UP CORE
MILLED TO 4' ABOVE DIAMOND BIT AND TRIED TO JAR FISH OUT.
(2)
11,544'—STARTED WITH AND 6 5/16" JUNK MILL 6⅛" A-Z JUNK BASKET
LOCATION OF BIT 11,548'
11,558'—14' ADDITIONAL HOLE MADE WITH JUNK MILL
(3)

**NO. 1. HERE** is the downhole situation after twistoff. There was no room to wash over and the fish could not be jarred loose after two trips with a taper tap. Estimated cost of a side-tracking job was $12,000 to $18,000. In the past, milling time on such jobs had required from a week to a month, or more. **NO. 2.** In just 16½ hours of milling time with a single 6¼-in. A-Z pilot mill (with 4 9/16-in. junk basket on pilot), 47 ft. of barrel and core were milled up. The milling tool was pulled but the remaining 4 ft. of barrel and core-bit fish couldn't be jarred out. **NO. 3.** After jarring failed, Harkins ran a 6⅜-in. junk mill into the hole and in 14 hours cleaned out the remaining barrel, stabilizer, and diamond bit and made an additional 14 ft. of hole.

# Speedy milling job saves sidetracking

IN JUST 30½ hours milling time, an alloy-steel core barrel with diamond bit was recently milled out of an 11,500-ft. well in Gonzales County, Texas. Many times in the past such milling jobs have required days or weeks. Just as often, milling attempts have been abandoned in favor of the costly process of sidetracking the hole.

The speedy South Texas milling job was in a wildcat being drilled by Harkins and Co. In the hole was a core barrel 51 ft. long and 5 11/16 in. in diameter. At the bottom of the barrel was a 6¾-in. diamond-core head. The job arose while coring in the Edwards lime at 11,508 ft.; the 6¾-in. core bit was working below a 9⅞-in. rock-bit-drilled hole above.

When the diamond bit stopped making hole, the string was pulled, showing that the outer barrel was twisted off at the safety joint. Retrieved with the drill string was the top portion of the core-barrel assembly and the inner barrel.

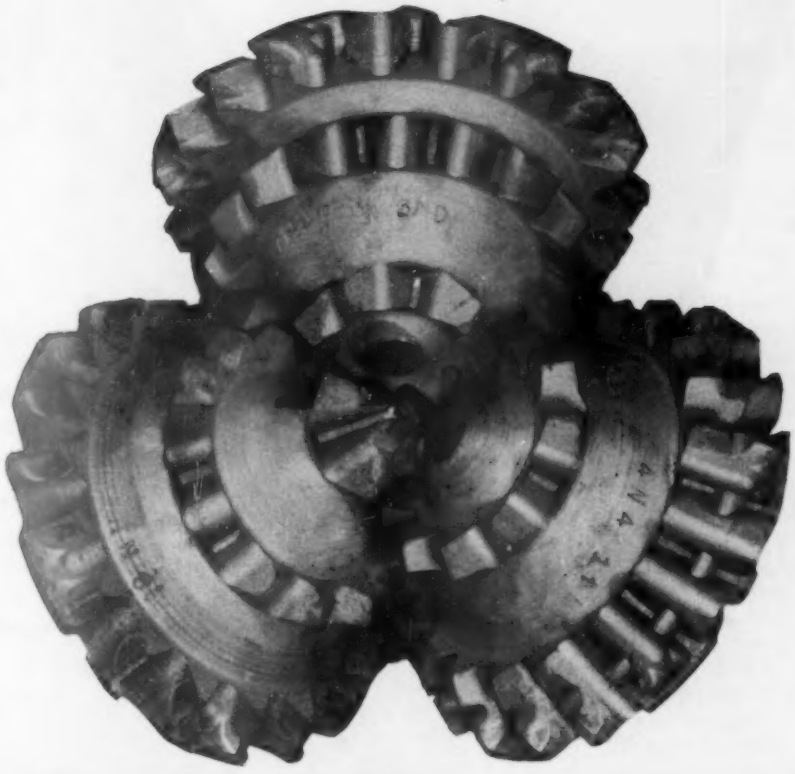
Left in the hole were 51 ft. of the outer barrel plus the core and the bit. The outer barrel was of AISI 4142 heat-treated alloy steel. On the outside surface were two stabilizers, one just above the diamond bit and one about halfway up the fish. Each stabilizer had six 10-in. blades faced with tube borium, an extra-hard surface to resist wear. These stabilizers were dressed to 6⅜-in. o.d.

First, Harkins engaged the fish with a taper tap and jars. This fish could not be freed. Then, the company decided to try milling down close to the diamond-bit head and to try recovering the bit intact by jarring.

The core left in the barrel was known to be hard. So, a pilot mill was selected to drill the top 47 ft. of fish. The pilot bit would drill up the core as the barrel was milled. In 16½ hours of milling, 47 ft. of the barrel was milled with an A-Z International Tool Co. pilot mill.

During milling, a 10.5-lb. mud with 60-S.s.U. viscosity was used; pump pressure was 1,200 psi., rotary speed 80 to 100 r.p.m. and milling weight 2,000 to 4,000 lb. Ten 6¼-in. drill collars were used with the string of 4½-in. drill pipe.

For how the job was completed, see illustration above.



# 4W4

## DESIGNED FOR DRILLING THE HARD FORMATIONS

**CHERT, PYRITE, GRANITE, AND HARD SAND ROCK**

Smith Type 4W4 rock bits are specially designed to drill hard abrasive formations requiring maximum resistance to gage wear. These bits are particularly suited to withstand the stresses imposed in drilling hard formations under extremely heavy loads and have the required true-rolling and chipping-crushing action for drilling high compressive strength rocks. Heavily hardfaced, circumferential webs on the gage teeth protect the bit against loss of gage.

1936 OUR 25th YEAR 1961

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COMPTON, CALIFORNIA

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# Scalechek fights this pay clogging build-up even at 260° F

NOW Halliburton's Scalechek Technique using SCP-3 works *in the formation* to help control build-up of common gyp (calcium sulphate) and most other scales at temperatures up to 260° F.

SCP-3 dissolves at an extremely slow, controlled rate to provide long-lasting treatments in high temperature wells. It is one of two complex polyphosphates, usually injected with a fracturing treatment deep into a formation. The other, SCP-2, acts most effectively in wells with less than 200° bottom hole temperatures.

Scalechek makes possible the control of scale *at its source* in the formation by keeping the contacted scale forming materials in solution, helping prevent production-robbing build-up in the matrix or in the tubing and pump. The treatment can be injected with water or oil-base fracturing fluids and is sometimes injected without sand. Only three parts per million in formation brine are required.

Scalechek has provided successful scale control in many wells from six months to over a year. One West Texas well with a record of severe scaling was treated with Scalechek over three years ago. A recent inspection of the well's pump showed that no scale had formed. Offset wells that were not treated have been plagued by serious scale problems.

Let a Halliburton man assist you in planning a Scalechek Program. It can help cut operating expenses on your wells and result in greater production.

*Keep Wells Clean . . . Chemically*

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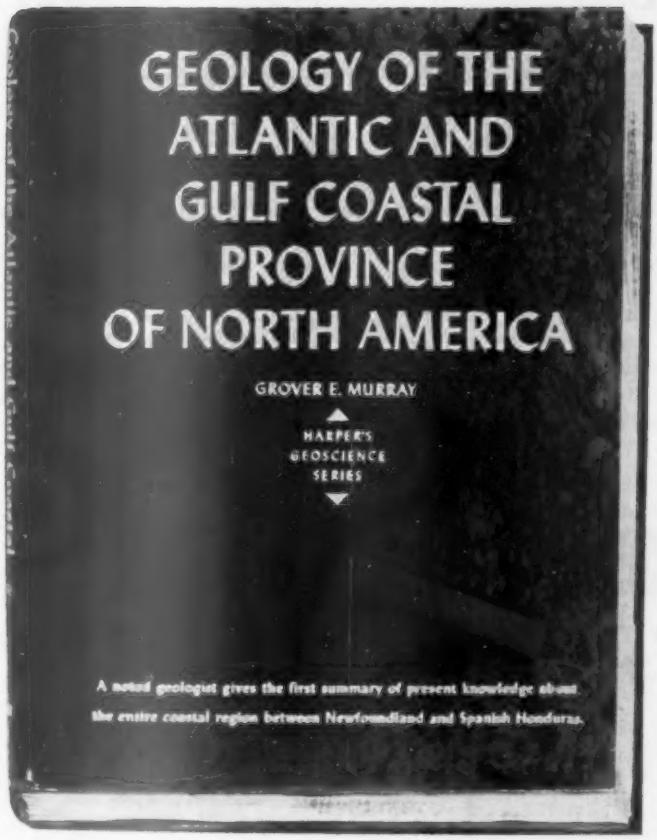

GEOLOGY OF THE ATLANTIC AND GULF COASTAL PROVINCE OF NORTH AMERICA
GROVER E. MURRAY
HARPER'S GEOSCIENCE SERIES
A noted geologist gives the first summary of present knowledge about the entire coastal region between Newfoundland and Spanish Honduras.

# . . . new tool for your kit

BY FRANK J. GARDNER

TO A BOOKSELLER, a good book is one that sells. To a collector, it's one that's rare. To a scientist, it's one that's instructive . . . and therefore a usable tool.

Such a book has just appeared. It's instructive, usable, and no doubt will sell. It isn't rare, but it could well become so. Certainly it's a tool, especially for the oil finder.

"Geology of the Atlantic and Gulf Coastal Province of North America" is its title. Dr. Grover Murray, Boyd Professor of Geology at Louisiana State University, is its author. Harper & Brothers of New York published it as part of its Geoscience Series.

Here, for the first time, is a sweeping summary of our geologic knowledge of one of the world's greatest oil provinces and of a potential oil province. It embraces the vast coastal region from Newfoundland to Spanish Honduras. It's a 3-D look at the Continental Shelf, the coastal plain, and the older geologic elements which flank and have influenced the Mesozoic - Cenozoic coast. It delves into history, stratigraphy, structure, physiography, and economics.

Grover Murray is an accepted authority on all things coastal. He has, through the years, contributed much to the literature of the region. But this book is the literary apex toward which he's been building. Crammed into its 692 king-sized pages is practically all our present-day knowledge of the area it covers. The author makes no claim to all-original material; rather, he has sifted, culled, and polished the millions of words that have been printed about his subject, and enhanced them with his own interpretations. In the process, a coastal bibliography of singular importance has emerged —this alone occupies 83 pages of the book.

Most striking chapters in this work are those concerned with structural geology, faults and fault patterns, and salt structures. Naturally, the section on mineral resources has an immediate appeal for the oil finder. But regardless of subject, every part of the book is interesting and instructive. It's hard to recall a volume more profusely illustrated, and the eye is caught on nearly every page by arresting photographs or maps; especially interesting is the author's presentation of stratigraphy and physiography in pictures.

You'll not find an itemized field study in this book, for the author touches on the oil resources of his bailiwick rather briefly. But the geologic pictures painted in the text should stimulate a lot of thought on the how and why of oil occurrence past and future. The Atlantic Coastal Plain remains a distant challenge to those who would find oil, and its geologic setting is amply covered in this work. It's the undiscovered and not the discovered that should preoccupy the reader . . . and in this light, the book becomes a tool.

This emphasis on the future is highlighted in the author's preface when he poses a dozen unanswered questions about the geology and development of his area; in his words, "more questions stand unanswered than when the work was begun."

For example, Murray asks: "What is the history that gives rise to thick accumulations on continental borders? Are the margins so weak that with time they yield even to light loads? Why have Mesozoic and Cenozoic accumulations in eastern North America continued to accord generally with the earlier margins of the continent? Has the accumulation been one of simple outbuilding at the margins of the continent, effecting subsequent structure in the process, or has the relationship been a 'chicken and egg' one?"

If this book provides the questions, perhaps it will help those who take it in hand to come up with the answers. Again in Murray's words, "Much analyzing has indeed been accomplished."

# New Pennsylvanian discoveries

PENNSYLVANIAN exploration in the northeastern part of Wyoming's Powder River basin is at a new high this year with five new Minnelusa discoveries on the books. These five new Pennsylvanian fields plus six new Cretaceous finds give this portion of the basin one of its brightest outlooks since the play began several years ago.

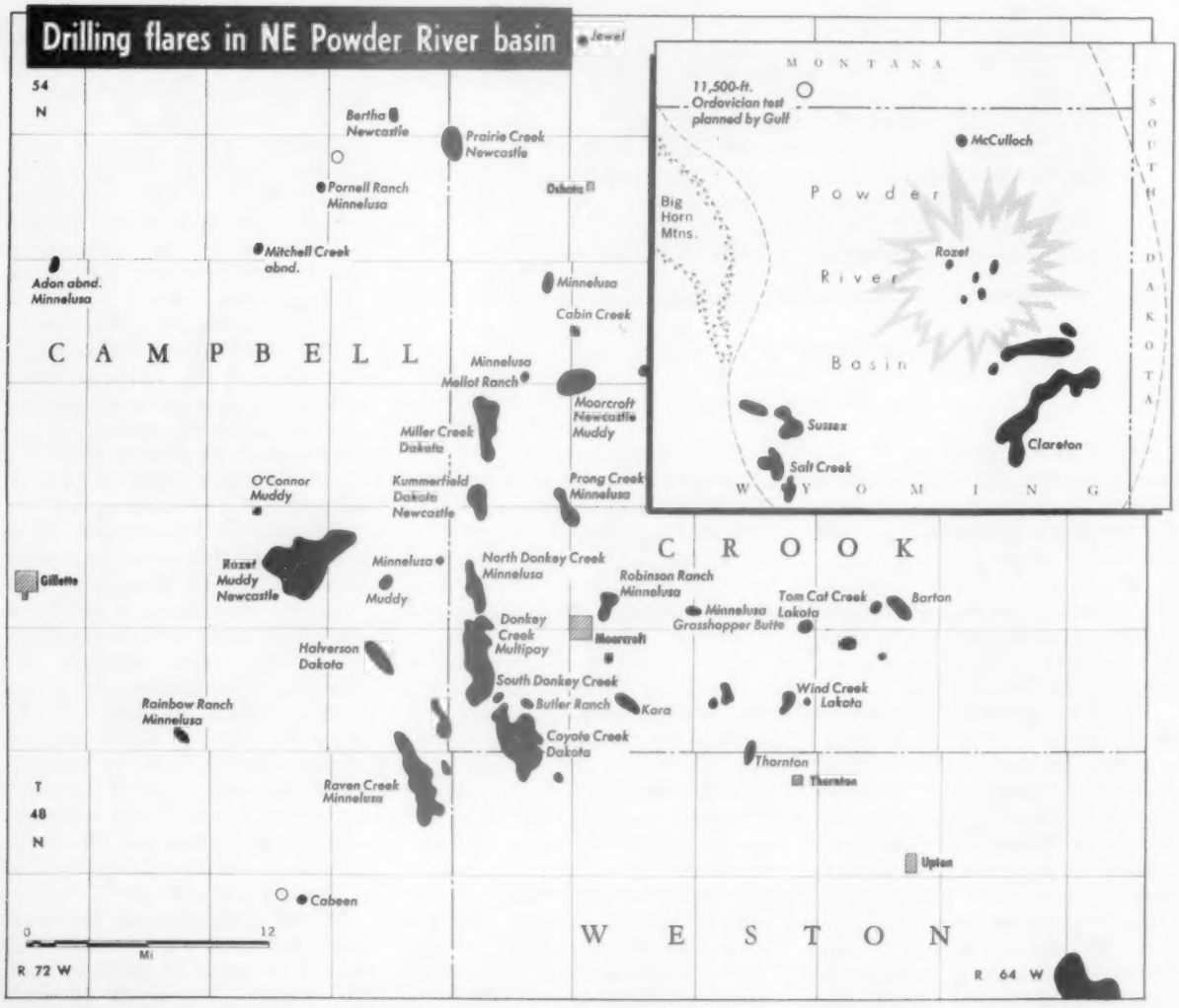
The accompanying table and maps give the success story of the northeastern Powder River basin. Note that most of the success has been since 1958. There have already been more new oil fields opened in the Crook-Campbell County area this year than in all of 1960. At the beginning of September nearly 41% of all Wyoming drilling was being done in the Powder River basin. Almost 50% of the wildcatting was under way in this part of Wyoming.

**Two attractive targets.** Both Pennsylvanian and Cretaceous rocks are getting a big appraisal in the northeastern Powder River basin. Focal point of this heavy exploratory and development is in the Crook-Campbell County area, where such fields as Raven Creek, Rozet, and Robinson Ranch have blossomed in the past couple of years. Most of the Pennsylvanian interest was fired at the discovery of Robinson Ranch in 1958.

Pennsylvanian rocks had never held much sway in Powder River exploration until that time. A few small fields had been tapped on the eastern edge of the basin, and one or two scattered ones in the middle.

A 1961 discovery at Raven Creek is this year's big development center. This rapidly growing field has replaced Robinson Ranch as the best Minnelusa field in the basin. Production at Raven Creek surpassed Robinson Ranch in May with 2,883 bbl. per day compared to 2,258 bbl. per day for the latter.

Through May, Robinson Ranch




**ROCKY MOUNTAIN OIL HUNTERS** are looking with new vigor for both Cretaceous and Pennsylvanian oil in Wyoming's northeastern Powder River basin. This year's tally of new fields is the best yet in this big basin.

# spark Powder River play

## Northeastern Powder River basin field data

| Field, county—Company and well | Year disc. | Location | Pay | Prod. depth | No. of wells | 1,000 bbl. cum. prod. 1-1-60 | Method of discovery | Trap |
|---|---|---|---|---|---|---|---|---|
| 1. Bertha, Campbell— | | | | | | | | |
| Black Hills-Voss Oil | 1955 | 54n-69w | Newcastle-Cret. | 5,442 | 2 | 16 | Subsurface | Strat. |
| 2. Adon, Campbell—Texaco | 1948 | 2-52n-72w | Minnelusa-Penn. | 9,090 | 1 | 33 | Seismic | Anticline |
| 3. Barber Creek, Campbell— | | | | | | | | |
| Davis 1 Govt. | 1958 | 22-50n-76w | Parkman-Cret. | 6,700 | 6 | 271 | Trend disc. | Monocline |
| 4. Butler Ranch, Crook— | | | | | | | | |
| Pet. Inc. 1 Butler | 1958 | 22-49n-68w | Muddy-Cret. | 5,922 | 1 | 2 | Subsurface | ..... |
| 5. Cabin Creek, Crook— | | | | | | | | |
| Skelly 1 Dunning | 1958 | 19-52n-67w | Muddy-Cret. | 3,890 | 1 | 0.4 | Subsurface | ..... |
| 6. Coyote Creek, Crook— | | | | | | | | |
| True 1 Krause | 1958 | 33-49n-68w | Dakota-Cret. | 6,478 | 49 | 1,224 | Subsurface | ..... |
| | 1960 | 28-49n-68w | Muddy | 5,089 | .. | .... | | |
| 7. Dead Horse Creek, Campbell— | | | | | | | | |
| California 1 Davis | 1957 | 30-49n-75w | Parkman-Cret. | 6,953 | 50+ | 1,703 | ..... | ..... |
| 8. Donkey Creek, Crook—True | 1953 | 49n-68w | Dakota | 6,268 | 62 | 3,301 | Seismic-sub- | Porosity trap |
| | 1956 | | Newcastle | 6,100 | .. | .... | surface | on nose |
| | 1957 | | Minnelusa-Penn. | 7,724 | .. | .... | | |
| 9. Grasshopper Butte, Crook— | | | | | | | | |
| Pet. Expl. | 1953 | 50n-66w | Newcastle-Cret. | 1,670 | .. | .... | Wildcat | Strat. |
| Chittim 6 State | 1959 | 50n-67w | Minnelusa-Penn. | 3,824 | 2 | 0.06 | Trend disc. | ..... |
| 10. Miller Creek, Crook— | | | | | | | | |
| Pet. Inc. 1 Michael-Cordell | 1959 | 8-51n-68w | Dakota-Cret. | 5,997 | 25 | 73 | Subsurface | ..... |
| 11. Moorcraft, Crook | 1956 | 52n-67w | Newcastle | 3,564 | 6, 1 gas | 115 | ..... | ..... |
| | | | Muddy | 4,065 | .. | .... | | |
| 12. Prong Creek, Crook— | | | | | | | | |
| Champlin 1 State | 1959 | 36-51n-68w | Minnelusa-Penn. | 6,400 | 5 | 20 | Subsurface-Seismic | ..... |
| 13. Robinson Ranch, Crook— | | | | | | | | |
| Pan Am 1 Robinson | 1958 | 32-50n-67w | Minnelusa | 6,080 | 11 | 843 | Surf., Subs., Seismic | ..... |
| 14. Slattery, Campbell— | | | | | | | | |
| Schlaikjer 1 Slattery | 1957 | 24-49n-69w | Muddy | 6,566 | 5 | 69 | Subsurface | ..... |
| 15. Timber Creek, Campbell— | | | | | | | | |
| True 1 State | 1958 | 16-49n-70w | Minnelusa | 9,380 | 1 | 7 | Surf.-Seismic | ..... |
| 16. Tom Cat Creek, Crook | 1959 | 50n-66w | Lakota | 404 | 6 | 2 | ..... | ..... |
| 17. Wind Creek, Crook— | | | | | | | | |
| Wyoming 1 Haunkel | 1958 | 23-49n-66w | Lakota | 728 | 10 | 4 | Subsurface | ..... |
| 18. Thorton, Crook-Weston— | | | | | | | | |
| Southwest | 1915 | 48-49n-66w | Frontier-Cret. | 600 | 9 | 0.5 | ..... | ..... |
| 19. Pownell Ranch, Campbell— | | | | | | | | |
| Pan Am 1 Hembt-Fed. | 1960 | 13-53n-70w | Minnelusa | 7,483 | 1 | .... | ..... | ..... |
| 20. Rainbow Ranch, Campbell— | | | | | | | | |
| True 1 Wolff | 1960 | 35-49n-71w | Minnelusa | 9,971 | 2 | .... | ..... | ..... |
| 21. Raven Creek, Campbell— | | | | | | | | |
| Kewanee 1 Norman | 1960 | 14-48n-69w | Minnelusa | 8,338 | 28 | .... | ..... | ..... |
| 22. Rozet, Campbell | 1949 | 50n-70w | Muddy | 6,940 | 53 | .... | ..... | ..... |
| Sinclair 1 Peter Svalina | 1959 | 23-50n-70w | Newcastle | 6,954 | .. | .... | Subsurface | ..... |
| 23. Kummerfield, Crook— | | | | | | | | |
| U. S. Smelting 1-32 | 1960 | 32-51n-68w | Dakota | 6,093 | 16, 1 gas | .... | ..... | ..... |
| 24. Mellott Ranch, Crook— | | | | | | | | |
| Skelly 1 Guthery | 1960 | 34-52n-68w | Minnelusa | 6,956 | 1 | .... | ..... | ..... |
| 25. Prairie Creek, Crook— | | | | | | | | |
| Rio et al. 1 Lewark | 1960 | 6-53n-68w | Newcastle | 5,307 | 10 | .... | ..... | ..... |
| 26. Miller, Campbell— | | | | | | | | |
| Stuarco et al. 1 Miller | 1961 | 21-50n-69w | Muddy | 6,502 | 2 | .... | ..... | ..... |
| 27. Wildcat, Campbell— | | | | | | | | |
| Clark F-50-70-4-C1 | 1961 | 4-50n-70w | Muddy | 7,251 | 1 | .... | ..... | ..... |
| 28. Wildcat, Campbell—Davis 1 State | 1961 | 34-49n-69w | Minnelusa | 8,420 | 1 | .... | ..... | ..... |
| 29. Dead Horse, Campbell— | | | | | | | | |
| Great Western 1 Dead Horse | 1961 | 11-47n-75w | Parkman | 7,257 | 1 | .... | ..... | ..... |
| 30. Schuricht, Crook— | | | | | | | | |
| Davis 1 Schuricht | 1961 | 11-52n-68w | Minnelusa | 6,782 | 1 | .... | ..... | ..... |
| 31. Halverson, Campbell— | | | | | | | | |
| Leone 1 Halverson | 1961 | 9-49n-69w | Dakota | 6,917 | 2 | .... | ..... | ..... |
| 32. O'Connor, Campbell— | | | | | | | | |
| Davis 1 O'Connor | 1960 | 30-52n-69w | Muddy | 5,975 | 2 | .... | ..... | ..... |
| 33. N. Donkey Creek, Campbell— | | | | | | | | |
| Hondo 1 Federal | 1960 | 13-50n-69w | Minnelusa | 7,902 | 1 | .... | ..... | ..... |
| 34. Koche, Crook— | | | | | | | | |
| True 4 Koch-Krause | 1961 | 21-49n-68w | Muddy | 6,345 | 1 | .... | ..... | ..... |
| 35. Kummerfield, Crook— | | | | | | | | |
| Mobil F-23-5-G | 1961 | 5-50n-68w | Newcastle | 6,210 | 1 | .... | ..... | ..... |
| 36. Gentry, Campbell— | | | | | | | | |
| McCulloch 1 Gentry | 1961 | 3-56n-69w | Minnelusa | 5,384 | 1 | .... | ..... | ..... |
| 37. Jewel, Crook—Shell 1 Fowler | 1961 | 7-54n-67w | Minnelusa | 6,035 | 1 | .... | ..... | ..... |

Minnelusa fields, 15; Dakota fields, 5; Muddy fields, 10; Newcastle fields, 7; Parkman fields, 3; Frontier fields, 1; Lakota fields, 2. Total Cretaceous fields, 28; total Penn. fields, 15.

had produced 2 million barrels of oil. Raven Creek through May had already put out nearly 600,000 bbl. There are now 28 producing wells at Raven Creek, making it one of the most active fields in Wyoming.

**Give Wyoming a lift.** Wyoming has been taking second place on the drilling scale this year in the Rocky Mountains. New developments in the Powder River basin may put the state back in business. In late October a flock of new locations hit the Powder River map. Current wildcat activity includes:

1. Shell 34-2 Schuricht, SW SE 2-52n-68w. Rotary is being moved out at the north extension to Davis Oil Co.'s Schuricht discovery. Pipe was set after recovering 3,020 ft. of oil on a drill-stem test in the Minnelusa.
2. MKM Oil Co. is waiting for cement after running casing to 6,358 ft. at 1 Robinson Ranch in NW NW 4-49n-67w, south of Robinson Ranch field. Two drill-stem tests got oil in the Minnelusa.
3. Davis 1 Federal-Robinson, SW SE 22-50n-67w, is being completed.
4. Cabeen Exploration Co. will drill a 9,400-ft. Minnelusa wildcat 7 miles southwest of Raven Creek field in Campbell County. The 1 Murphy-Federal, C NE NE 11-47n-70w, is 4 miles from nearest Pennsylvanian drilling to the east and north. Nearest Minnelusa oil is at Raven Creek. Rainbow Ranch Minnelusa field lies 9 miles northwest.
5. E. M. Davis 1 Federal-Mann, C NE NE 19-54n-68w, Crook County, will test the Minnelusa to 6,900 ft. This one is 3 miles northeast of Bertha Muddy field.
6. Gulf Oil Corp. will go to 11,500 ft. and Ordovician at a wildcat in Montana's portion of the basin. This Powder River County wildcat is in an area of scant deep drilling.
7. Shell Oil Co. has shut in for storage after making 420 bbl. of oil on a pump test at the 1 Fowler in C SW NW 7-54n-67w, Crook County. This Minnelusa discovery opens Jewel field, 12 miles north of nearest similar oil at Davis Oil Co. 1 Schuricht in SW NE 11-52n-68w.
8. McCulloch Oil Co. 1 Government-Gentry opens Gentry field in SW NW 3-56n-69w, Campbell County. This well swabbed 480 bbl. per day from Minnelusa at 5,384-86 ft., opening Minnelusa production far to the north of any oil fields.

At the present clip, the northeastern Powder River basin is fast becoming one of Wyoming's new oil frontiers. Exploratory success wafted through the region in 1958, 1959, and 1960, but 1961 seems to be the big year. This year's discoveries will be watched closely as Rocky Mountain oil hunters look for more Raven Creeks.

This year's discoveries in the northeastern Powder River basin of Wyoming:

1. Campbell County: Stuarco Oil Co. et al. 1 Miller, C SW SE 21-50n-69w. IPP 233 BOPD, Muddy Cretaceous. TD 6,820 ft.
2. Crook County: Mobil Oil Co. F23-5-G, NE SW 5-50n-68w. IPP 8 BOPD, Newcastle Cretaceous sand. TD 6,210 ft. Discovery in Kummerfield field.
3. Crook County: True Oil Co. et al. 4 Koch-Krause, C SW SE 21-49n-68w. IPP 13 BOPD, Muddy sand. TD 6,345 ft.
4. Campbell County: Clark Oil & Refining Co. F-50-70-4-Cl, C NW NE 4-50n-70w. IPP 30 BOPD, Muddy Cretaceous 7,251-58 ft. TD 9,096 ft. Muddy discovery, new field.
5. Campbell County: E. M. Davis 1 State, C SW NE 35-49n-69w. IPP 484 BOPD, Minnelusa Pennsylvanian 8,400-38 ft. TD 8,637 ft. Minnelusa discovery, new field.
6. Campbell County: Great Western Drilling Co. 1 Dead Horse, C SW SW 11-47n-75w. IPP 45 BOPD, plus 65-70% water, Parkman Cretaceous 7,257-71 ft. TD 7,370 ft. Parkman discovery, new field.
7. Crook County: Davis Oil Co. 1 Federal-Schuricht, SW NE 11-52n-68w. IPP 377 BO in 16 hours, Minnelusa 6,782-6,804 ft. Minnelusa discovery, new field.
8. W. C. Leone et al. 1 Halverson, C SE NW 9-49n-69w. IPP 200 BOPD, Dakota Cretaceous 6,917 ft. TD 7,053 ft. Dakota discovery, new field.
9. Campbell County: McCulloch Oil Co. 1 Government-Gentry, SW NW 3-56n-69w. IP Swab 480 BOPD, Minnelusa 5,384-86 ft. TD 5,582 ft. Minnelusa discovery, new field.
10. Crook County: Shell 1 Fowler, C SW NW 7-54n-67w. IPP 420 BOPD. Minnelusa 6,035-50 ft. TD 6,180 ft. Opens Jewel field.

**Current active tests**

Campbell County, 16.
Crook County, 14.

# Alberta strike may uncover important new gas pool

ANOTHER major gas field is becoming a distinct possibility in the Harmattan - Elkton region of southwestern Alberta, 45 miles northwest of Calgary.

Shell Oil Co. of Canada, Ltd., released some detail on a well which it drilled on the region as a deep-pool test and which discovered slightly condensate-bearing natural gas in a fairly thick buildup of Devonian reef. The well itself was drilled some time ago but due to available crown lands in the district, Shell went tight with information and while it was rumored to be a D3 gas strike, confirmation was only received recently.

The well, Shell-Canadian 4-15-32-4 Harmattan, on LSD 4, 15-43-4w5, found somewhat over a 200-ft. net pay reef section in the hole below 10,757 ft., or 7,241 ft. subsea, and on the basis of production test a calculated open-flow potential of 98 M.M.c.f.d. was established. Condensate cut was negligible.

Since discovery Shell and Canadian Superior have taken another hole in the area—originally scheduled as a Mississippian evaluation—to the reef but after failing to find the same gas - bearing formation present plugged it back to its original objective and capped it as a potential gas producer.

Amerada Petroleum Corp. is attempting to extend the pay zone in a northwesterly direction by another reef evaluation 1¾ miles north-northwest. That venture is not deep enough as yet to indicate possibilities but has indicated success in the Mississippian.

This play is taking place in the corridor that separates the Harmattan - Elkton Mississippian oil pool from the same type of production in Harmattan-East field. It lies northwest of the northern top of Cardium Alley and while developed to a great degree for Mississippian the reef discovery is the first hole taken down to that formation in the immediate region.

The closest previous D3 gas production to the strike would be gas-cap production in the Innisfail reef field a little over 20 miles northeast. The intensity of drilling within the circumference of an imaginary circle with a 20-mile radius of the strike, could be no better pointed out than by the number of Mississippian and Cardium sand oil and gas-producing pools. Included in those are: Harmattan-Elkton; Harmattan-East; Sundre; Westward - Ho; Caroline; Carstairs and Wildcat Hills (all Mississippian); and the Crossfield Mississippian and Cardium sand field and the Garrington Cardium oil field.

## Far-North well below 5,500 ft.

Dome Petroleum, Ltd., has announced that the Dome et al. 1 Winter Harbour well, located on Melville Island in the Canadian Arctic, is now drilling below

5,500 ft.

This well is located 1,600 miles north of Calgary and is the first test in the Canadian Arctic islands. It is expected that the well will be drilled to at least 10,000 ft. and has reached its current depth without encountering any major difficulties.

There are now 15 oil companies and mining groups involved in drilling this well. The contractor is Peter Bawden Drilling, Ltd., Calgary.

# Alaskan oil, gas prospects grow

**Industry has done little work in the vast Arctic slope, but there is now a definite new interest building up in northern Alaska.**

RECORDS of the geological survey maintained by the regional oil and gas supervisor in Alaska reveal substantial progress in oil and gas-development operations.

The Arctic slope of Alaska is known to contain oil and gas deposits on and adjacent to Naval Petroleum Reserve 4, as evidenced by seeps discovered many years ago, and, more recently, by actual drilling operations between the years 1944 and 1955, principally by the Navy.

Industry has done little work in this vast area. However, there is renewed interest in the northern part of the state. In recent months several companies have obtained leases and are doing seismic and geologic work preliminary to the formation of development contracts in areas north of the Arctic Circle. Past lack of interest in this portion of Alaska may be attributed to the large area reserved by the Navy Department and the economics of operating in and transporting products from this remote area difficult of access.

**South leads.** All exploratory drilling activity by private industry from the summer of 1953 to date has been confined to the southern third of the state.

At present there are 13 rotary drilling rigs active in the following areas: 6 on the Kenai Peninsula, 3 in the southern coastal region, 2 in the Cook Inlet area, 1 on the Alaska Peninsula, and 1 in the Kuskokwim River area. Records show that there have been 102 wells spudded in Alaska (excluding the Naval Petroleum Reserve) from January 1953 to September 1961. About 30 million acres are now under oil and gas lease on public land.

**Kenai oil.** Other than the Naval Petroleum Reserve area, commercial quantities of oil and gas have been found only in the Kenai Peninsula area. There is strong evidence in support of the theory that the gas deposits (nearly pure methane) found to date originated from Carbonaceous deposits of Tertiary age, whereas the oil deposits found in the Swanson River Hemlock sands, also of Tertiary age, have migrated through fractures or other media, from deeper and more compressed formations of an older age.

Not to be outdone by progress in producing and transporting methods in the much older "oil country" in the "South 48," operators in Alaska are installing modern automation equipment to handle oil production from the Soldotna and Swanson River units in the Swanson River field. Upon completion, all production will be metered by lease automatic custody transfer units, and transferred directly to the 8-in. Kenai pipeline system for transport approximately 19 miles west to Nikishka wharf on Cook Inlet for shipment via tanker to California. The plans also call for building a complete refinery at Nikishka to process a portion of the crude oil for Alaska consumption, probably during the latter part of 1962.

In order to offset the rapidly declining bottom-hole pressures in the Swanson River field, the operator intends to repressure the Hemlock oil sands with gas produced with the oil, plus gas produced from several wells drilled to the shallow Kenai sands.

In the Swanson River field, as of September 1, 1961, there were 5 wells drilling, 40 producible oil wells, 32 producible gas wells, 2 salt-water-disposal wells and 6 dry holes or failures.

**Kenai gas.** Presently, the most important gas field in Alaska is in the Kenai unit, about 90 miles southwest of Anchorage. This field has five gas wells ranging in depths from 4,200 to 4,800 ft. Three of these wells are connected to the recently completed pipeline supplying natural gas to the Anchorage area. This service began on August 14, 1961.

Four other units within the Kenai Peninsula contain gas wells, varying in depth from 4,000 to 7,000 ft., and extending from the Swanson River unit south and west to the Falls Creek unit, a distance of about 50 miles. With the exception of the Kenai unit gas, now connected to the pipeline system serving Anchorage, no market has been developed for the gas. However, it is understood that one major oil company is making a study of the feasibility of compressing the gas for shipment in specially designed tankers to Japan. Gas reserves in the Kenai gas field are estimated to be sufficient to furnish Anchorage with gas for 100 years.

**Gross oil production and value, Swanson River field**

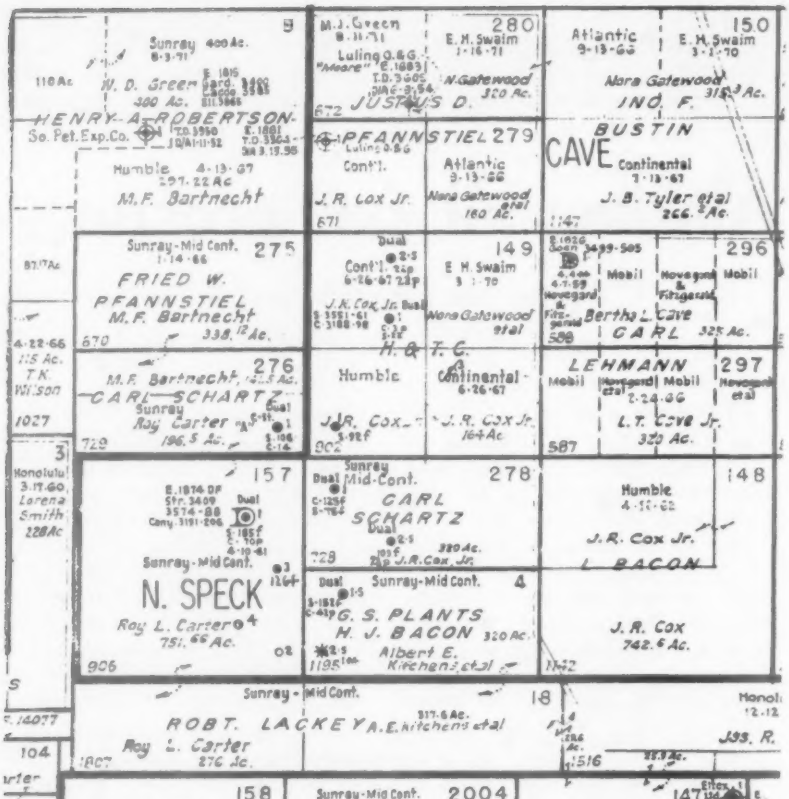
| | | |
|---|---|---|
| Cumulative to 7/1/61 | 2,875,819 bbl. | $6,991,695 |
| Cumulative value of royalty to 7/1/61 | | $667,597 |
| July 1961 production | 578,584 bbl. | $1,538,212 |
| July 1961 royalty | | $161,206 |
| August 1961 production | 661,829 bbl. | $1,963,685 |
| August 1961 royalty value | | $207,207 |
| Cumulative to 9/1/61 | 4,116,232 bbl. | $10,493,592 |
| Cumulative value of royalty to 9/1/61 | | $1,036,010 |
| Average daily production as of 9/1/61 | 20,900 bbl. | |
| Present price of oil per barrel (Swanson River unit 32.0° grav. | | $2.78 |
| (Soldotna Creek unit 36.5° grav. | | $3.01 |

# Pace quickens in Texas' Concho

CONCHO, the first county east of the city of San Angelo, has never been a big oil producer. After years of slow development and off-and-on production, the total output is only a little over 175,000 bbl. Up to June this year only seven oil wells and two gas wells were on production in this little-heard-of county in West Texas. Since June the oil history of Concho County has picked up several important new chapters. Now this county on the north side of the hard-to-tap Edwards Plateau country is being swept by a sudden flurry of oil hunting.

**Two simultaneous discoveries.** Two discoveries earlier this year set the stage for an oil development that is picking up speed this fall. Last March Sunray Mid-Continent Oil Co. opened two-pay North Speck field, 8 miles northwest of Eden. The 1 Carter flowed 185 bbl. of oil per day on 12/64-in. choke from Strawn Pennsylvanian sand at 3,574-88 ft. Later Sunray dually completed the well at Canyon Pennsylvanian at 3,191-3,206 ft. for 70 bbl. per day on pump. Since then eight more producers have been added to the field.

A few weeks ago Sunray opened another new field in the southwestern part of the county at West Eden. The 1 Henderson opened Hope lime pay (upper Cisco-Pennsylvanian) at 2,393-2,401 ft. The well made 85 bbl. per day on pump. This field now has two producers.




**THIS PORTION** of Concho County, West Texas, shows the rapid development taking place in the newly opened North Speck area near the center of the county. Map courtesy of Southwest Mapping Co., Continental Life Building, Fort Worth.

These two discoveries were followed later in the summer with a dual Bend and Strawn oil discovery at Sunray 1 Ella Houston, 2 miles east of Paint Rock. This find opened West Paint Rock field, west of the gas production in Paint Rock itself. The Houston discovery flowed 116 bbl. of oil per day from Strawn and 31 bbl. per day from Bend conglomerate. There are now five wells in this field.

**And then a big gasser.** One of the biggest gas discoveries ever completed in West Texas is Holland Oil Co. et al. 1 Marion Hays, 4½ miles southeast of Paint Rock and west of the Goen gas discovery in Paint Rock gas field. The Hays well flowed 350 M.M.c.f.d. from Goen lime. This well moves Paint Rock gas production to the southwest.

**A big teaser.** Concho's oil output has only been about 175,000 bbl., Speck field accounting for most of it since 1953. These new oil discoveries are not big compared to most flush strikes of other West Texas counties, but they are a real boon to a dwindling oil hunt in this area that hugs the north side of the Llano uplift. A circle of barren and nearly oil-barren counties surrounds this huge uplift. Very few of the surrounding counties have any oil or gas; some have had little or no exploration. It is true that production in the Concho fields has been in spurts and hasn't stood up very long. But explorers have been tending to make another try in the counties west and northwest of the Llano "fist." Menard has been getting a play this year, and now Concho.

The Concho development is only in the infant stage. It will take some

more development before we can tell whether the usual "poopouts" (like Pfluger) take place. This part of Texas is still a wildcat frontier.

North Speck, West Eden, and West Paint Rock have done more for Concho County's oil hopes than all of the drilling years in this sector combined—all in a few short months. Concho is a big county. Producers are far-removed from one another. The accompanying portion of Southwest Mapping Co.'s Concho County map is currently the busiest corner of the county.

## 1961 discoveries

1. Sunray Mid-Continent 1 R. L. Carter, 8 miles north-northwest of Eden in Sec. 157, Blk. 72, T&NO Sur. IPF 185 BOPD, 12/64-in. choke, 46.2°, GOR 638:1, CP 900 psi., Strawn Pennsylvanian lime 3,574-88 ft.; IPF 70 BOPD plus 44 bbl. water, 41°, GOR 1,500:1, Canyon sand 3,191-3,206 ft. TD 3,992 ft. Dual-zone oil discovery. North Speck field.

2. Sunray 1 J. E. Henderson, 8 miles southwest of Eden in Sec. 55, Blk. 8, H&TC Sur., 7 miles northeast of Ha-Jo Canyon field. IPP 85 BOPD, 37.7°, GOR 177:1, Hope lime 2,392-2,401 ft. TD 4,320 ft. New oil discovery.

3. Sunray 1 Ella Houston, 2 miles east of Paint Rock in AB&W Sur., 1⅜ miles west of Paint Rock Pennsylvanian gas field. IPF 116 BOPD, 41°, no water, GOR 504:1, 11/64-in. choke, TP 350 psi., CP packer, Strawn 3,456-64 ft. TD 3,828 ft.; IPF 31 BOPD plus 20 BWPD, 38.1°, GOR 650:1, Bend Conglomerate 3,720-26 ft. TD 3,828 ft. Dual-zone oil discovery.

4. Tucker Drilling Co. 1 Cora Henderson, 10 miles southwest of Eden in Sec. 43, Blk. 8, H&TC Sur. 1¼ miles southwest of one-well Eden Hope lime field. IPF 116 BOPD, 38.2°, GOR 658:1, 14/64-in. choke, TP 120 psi., CP packer. Goen lime 4,055-58 ft. TD 4,360 ft. New oil discovery.

5. Holland Oil Co. et al. 1 Marion Hays, 4½ miles southeast of Paint Rock in Sec. 135, Blk. 72, T&NO Sur., 1¾ miles south and west of Winn and Hollan 1 McIver Goen discovery in Paint Rock gas field. IPCAOF 350 M.M.c.f.d., Goen lime 3,376-86 ft. TD 3,683 ft. One of the biggest gas discoveries in West Texas.

## Current active wildcat wells

1. Lon H. Cron 2 Byrdie H. Cox, Sec. 28, Blk. 9, H&TC Sur. 11 miles northwest of Eden in west-central part of county. IPF 312 BOPD, 36.5°, GOR 599:1, TP 325 psi., CP packer, 3,552-59 ft. TD 3,965 ft. Wildcat discovery. 5 miles north of West Eden Hope field.

2. Holland Oil Co. et al. 1 Hutcheson, J. M. Goforth Sur. 136, Blk. 72, T&NO Sur., 5 miles southeast of Paint Rock in north-central part of county, 1½ miles south of Paint Rock Multipay field. Perforating.

3. Luling Oil & Gas Co. 2 Maud Houston, Peter Bock Sur. 288, 2 miles southeast of Paint Rock. Drilling 2,200 ft.

4. George Parker and Holland Oil Co. 1 Davidson-Norman Sullivan, Sec. 309, Blk. 72, T&NO Sur. 3 miles east of Paint Rock, ⅝ mile west of Gardner lime discovery in Paint Rock gas field and ¾ mile east-northeast of one-well field at Paint Rock West Strawn oil field. Location.

5. Parker-Holland 1 Ella Houston, Edward Crammer Sur. 308, Blk. 72, T&NO Sur., 3 miles east of Paint Rock, ¾ mile east of discovery in Paint Rock-West Bend and Strawn lime field, ¾ mile west-southwest of Gardner lime gas discovery in Paint Rock Multipay field. Location.

## Current active field wells

1. Continental Oil Co. 1-A H. R. Campbell, OWPB, Paint Rock Goen gas field, OTD 3,760 ft. Sec. 137, Blk. 72, T&NO Sur., 7 miles southeast of Paint Rock, 3 miles south-southwest of Goen gas production, originally drilled by Bocket, Sloss & Rock Hill as 1 Campbell, D&A 1951. TD 3,771 ft. Testing. Ellenburger 3,658 ft.

2. George Parker-Holland 1 Houston & Sullivan heirs, Paint Rock Goen gas field. Sec. 308, Blk. 72, T&NO Sur., 4 miles east of Paint Rock, 1¼ miles north Goen gas discovery and lone producer in that pay. Location.

3. Sunray 2 Carter, North Speck Strawn field. Sec. 157, Blk. 72, T&NO Sur., 7½ miles northwest of Eden. Perfs. 3,654-59 ft. in Strawn. Preparing to dually complete in Canyon and Strawn. Canyon 3,232-42 ft.

4. Sunray 3 Carter, North Speck field, Sec. 157, T&NO Sur., 8 miles north-northwest of Eden. IPF 126 BOPD, 14/64-in. choke, 44.8°, GOR 723, TP 80 psi. TD 3,707 ft. Preparing to dually complete.

5. Sunray 4 Carter, North Speck Strawn, Sec. 157, T&NO Sur., TD 3,725 ft. Running electric log.

6. Sunray 3 J. E. Henderson, West Eden Goen field. Sec. 54, Blk. 8, H&TC Sur., 9.2 miles south-southwest of Eden. TD 4,230 ft. WOC.

## Concho County fields not officially abandoned

1. Dodson. Discovery 1940. Pay Strawn. One well. Cumulative production to 1-1-60 is 7,000 bbl.

2. Eden Marble Falls. Discovery 1945. Marble Falls pay. Three gas wells. 92 M.M.c.f.d. produced in 1959.

3. Ha-Jo Canyon. Discovery 1956. Canyon sand pay. One oil well. Cumulative production. 13,000 bbl.

4. Hartgrove Tannehill. Discovery 1927. Tannehill sand pay. One gas well. Produced 35 M.M.c.f. in 1959.

5. Millersview Waide. Discovery 1953. Penn. sand pay. Two oil wells. Cum. 9,000 bbl.

6. Paint Rock Multipay field. Discovery 1955. Five oil wells, nine gas wells. Strawn, Canyon, Goen pays. Now developing.

7. Pfluger. Discovery 1951. Swastika pay. One oil well. 22,000 bbl. cum.

8. Speck Strawn. Discovery 1953. Caddo, Strawn. Two oil wells. 57,000 bbl. cum.

9. Speck Jennings. Discovery 1957. Jennings pay. Three oil wells. Cum. 31,000 bbl.

10. North Speck Strawn and Canyon. Discovery 1961. Nine oil wells. Still developing.

11. West Eden. Hope and Cisco. Discovery 1961. Two oil wells. Still developing.

# Northeast Enid gets new wells

IN OKLAHOMA Livingston Oil Co. has announced two new wells in the Northeast Enid area, as well as significant developments in the company's Ringwood and North Homestead areas in Oklahoma and in its Phillips County, Kansas, property.

Livingston's 1 State C, located SE SE 36-23n-6w in Garfield County, is being completed as a discovery in the Mississippian limestone between 6,380-6,440 ft. Initial tests showed the well flowing at 20 bbl. of oil per hour, with no water. A diagonal offset well, 1 State A, NW SE 36, was being tested in the Misener zone at 6,638-50 ft. at the rate of 40 bbl. of oil plus 200 bbl. of water per day.

The Mississippian zone in the 1 State A well had several shows and will be tested. Livingston has more than 5,000 acres of leases in this area.

In the company's 1 Ring unit in Major County, a well is being completed as an apparent field extension in the NE SW 7-22n-11w. Both the Manning and Mississippian-Meramec zones are apparently productive of gas in this well. This is the farthest northwest extension of the Ringwood field area to date. The company is engaged in an extensive development program in the proved area of Ringwood field, using two drilling rigs.

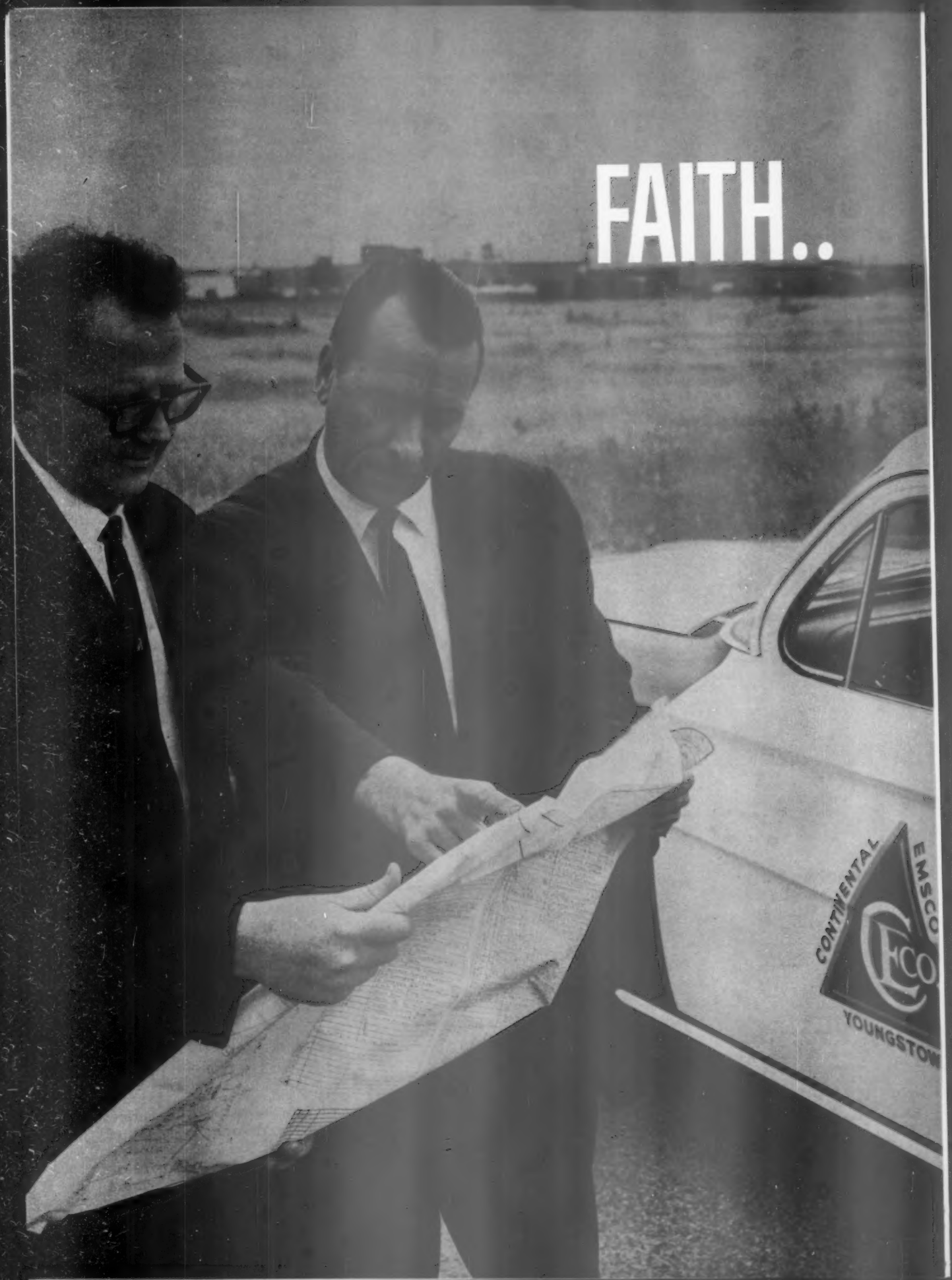
In the North Homestead area of Major County, Oklahoma, Livingston is drilling at 3,500 ft. in the 1 Smith A, NE NE SW 30-20n-11w, and is participating in the Kingwood 1 Krause, NW SE 18-20n-11w, now being completed, and in the Eason-Ewing unit, a new location in 24-20n-12w.

Livingston also announced the drilling of an offset to a four-zone discovery well in the Kansas City-Lansing zones in Phillips County, Kansas. The 1 Seyler A, located NW NW SE 9-1s-18w, will be drilled to a projected total depth of 3,500 ft.

## Ohio's Morrow adds two producers

In Ohio, two more producers have been added to the fast-moving oil play in Morrow County.

United Producing Co. 3 O & E Myers, Section 33, Canaan Township, was bottomed in the granite at 4,100 ft. Production was found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in the Trempealeau logged at 2,976-3,120 ft. Final testing of this well indicated 20 bbl. of oil per day after acid treatment and fracturing of the formation from 2,980-96 ft.

Atlas Exploration Corp. test in Cardington Township, about 1¾ miles southeast of the discovery well, is pumping 100 bbl. of oil per day and 40 bbl. of water. The Trempealeau in the 1 J. & R. Wolfinger, Section 3, was found at 2,995-3,025 ft.

Also, about 8 miles northwest of this play, Reliance Oil Corp. has announced a granite test in Dallas Township, Crawford County. Location is on 1 Garrett White, Section 11, and is now drilling at 700 ft.

## Ohio field keeps high success rate

IN OHIO, three additional gas strikes in Smith pool in Smith Township, Mahoning County, and Deerfield Township, Portage County, mark the fourteenth success to one dry hole in this pool.

East Ohio Gas Co. reported a west extension in Deerfield Township, finaled at 2,949 M.c.f.d. with a rock pressure of 1,440 psi. Also, a southern extension in Smith Township, made 1,725 M.c.f.d. after fracture with rock pressure of 1,405 psi. The Clinton sand of 1 L. & A. Cline, Lot 37, and 1 J. & S. Doval, Section 10, was found at 4,792-4,872 ft. and 4,942-5,014 ft. respectively.

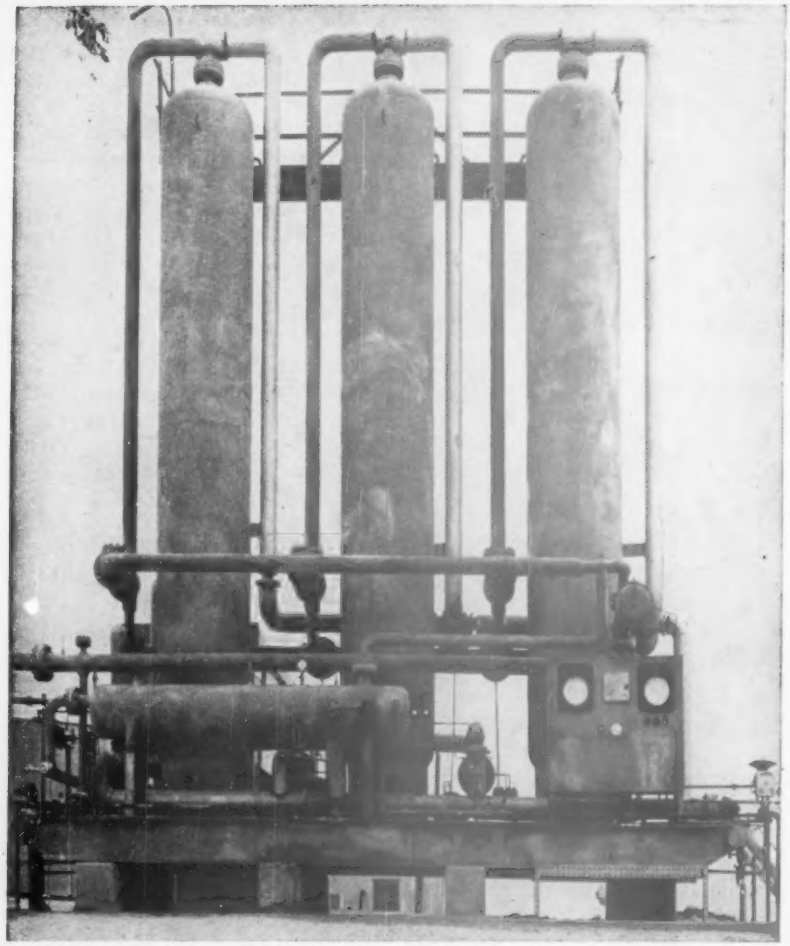
Another southern extension Atlas Exploration Corp. 1 John Stahl, Section 9, Smith Township, reported 579 M.c.f.d. with rock of 1,420 psi. from the Clinton at 4,987-5,050 ft.

In the general area, Atlas Exploration made a try for a pool opener in Berlin Township, Mahoning County. The Clinton was dry in 1 Viola Clark, Lot 18. Total depth was 5,054 ft.

## Illinois strikes range over state

NEW DISCOVERIES in the Illinois basin ranged from Jasper County in Illinois to Gibson County, Indiana.

In Jasper County, Vickery Drilling Co., Inc. 1 Guy Scott et al., NE



# Hy-Sorb's Dependability Means More Earnings

This latest Maloney-Crawford Hy-Sorb three-tower recovery unit is designed for 23 MMSCF/D and 150 B/d of 14# stabilized R.V.P. product. This productivity can be accomplished with 18-minute cycles and M-C's special pre-cooling feature. One of the reasons for the high output is the Hy-Sorb's over-all dependability. A major factor in this dependability is the simplified control system which operates the entire plant from the panel shown at right in the photo. The Hy-Sorb can be operated automatically or manually, and a single selector switch controls all functions of the three towers. This unit is installed on Mustang Island, off the Texas coast, and is dimetcoated for weather protection. Another Texas operator reports that a Hy-Sorb, installed downstream from cold separation, has increased his stock tank liquids 22%. Let us give you more information on how the Hy-Sorb can increase your income from gas streams.

**Maloney-Crawford**

**Box 659** **Tulsa**

SE SW 27-7n-9e, 2 miles northwest of Newton, swabbed 25 bbl. of oil per hour, natural, from McClosky lime at 2,971-79 ft. Location is 3 miles from production.

In Jefferson County, Illinois, J. T. Hurt 1 Young heirs, 34-1s-4e, 9 miles northeast of Mount Vernon, pumped 40 bbl. per day from McClosky at 2,930-45 ft.

In Sangamon County, Homeier & Weber Development Co. 1 Kunz, NE NE SE 2-14n-4w, 2 miles southeast of Rochester, made 40 bbl. of oil and 40 bbl. of water per day on pump from Silurian at 1,691-1,709 ft.

In Gibson County, Indiana, R. K. Petroleum Co. 1 Davidson heirs, 1-1s-10w, 3 miles southeast of Hazelton, is on pump for production tests of the Aux Vases at 1,830-36 ft. Swabbing got 2-4 bbl. of oil per hour after acid.

## Kentucky, Illinois attract drillers

Illinois basin activity centered in Webster County, Kentucky, and in Wayne, White, and Jasper counties, Illinois.

In Webster County, J. R. Powell, 1¼ miles north of Wanamaker, has a Tar Springs discovery at 1 Lila Allen in 16-n-23. Recovery on drill-stem test at 1,847-77 ft. was 45 ft. of gas, 105 ft. of clean oil.

In Illinois' Wayne County, 1 mile west of Orchardville, SW SE NW 29-1n-5e, N. V. Duncan Drilling Co. 1 Henson is testing in the O'Hara at 2,904-12 ft. Swab got 17 bbl. of oil per hour.

In White County, Slagter Producing Co. 1 Ellison Healy, NE SE SE 7-6s-8e, got 1,686 ft. of clean oil, 60 ft. mud-mixed oil, and 210 ft. oil-mixed mud on a drill-stem test in the Aux Vases at 3,162-76 ft. Casing is set to test at 3,174-85 ft. and in Rosiclare at 3,277-83 ft.

In Jasper County, Vickery Drilling Co. 1 Guy Scott et al., NE SE SW 27-7n-9e, 2 miles northwest of Newton, pumped 196 bbl. per day from McClosky lime at 2,971-79 ft.

## Louisiana failure pays off

An old hole in Rapides Parish, Central Louisiana, that was drilled in 1953 and abandoned as dry has been reentered and completed as an oil-discovery well.

## Western Canada completions—Sept. 1961

| | All wells | | | | | | | Wildcats | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Oil | Gas | Dry | Service | Footage | Cum. 1961 | Total | Oil | Gas | Dry | Footage | Cum. 1961 |
| **Western Canada** | **222** | **131** | **38** | **49** | **4** | **1,181,493** | **1,724** | **46** | **12** | **7** | **27** | **286,055** | **421** |
| Alberta | 140 | 64 | 35 | 37 | 4 | 887,170 | 1,135 | 40 | 11 | 7 | 22 | 263,480 | 298 |
| Saskatchewan | 53 | 46 | 0 | 7 | 0 | 176,293 | 440 | 4 | 1 | 0 | 3 | 18,047 | 50 |
| Manitoba | 5 | 1 | 0 | 4 | 0 | 10,662 | 23 | 2 | 0 | 0 | 2 | 4,528 | 8 |
| British Columbia | 24 | 20 | 3 | 1 | 0 | 107,368 | 111 | 0 | 0 | 0 | 0 | 0 | 50 |
| Northwest Territories | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 15 |

## Canada footage breakdown, Sept. 1961

| | Field wells | | | | Wildcats | | |
|---|---|---|---|---|---|---|---|
| | Oil | Gas | Dry | Service | Oil | Gas | Dry |
| **Western Canada** | **612,798** | **157,533** | **103,555** | **21,552** | **81,446** | **47,834** | **156,775** |
| Alberta | 377,784 | 144,578 | 79,776 | 21,552 | 76,859 | 47,834 | 138,787 |
| Saskatchewan | 143,031 | ..... | 15,215 | ..... | 4,587 | ..... | 13,460 |
| Manitoba | 1,950 | ..... | 4,184 | ..... | ..... | ..... | 4,528 |
| British Columbia | 90,033 | 12,955 | 4,380 | ..... | ..... | ..... | ..... |

The well, 1 Freeman, was drilled originally by J. R. Butler, and quit at 10,015 ft. Bateman Drilling Co., the new operator, cleaned out to 9,800 ft., cemented 4½-in. casing on bottom, and perforated at 9,727-34 ft.

Potential gage rated the well good for 30 bbl. of 43°-gravity oil daily. Its pressure is 30 psi.

Location is 16 miles southeast of Lecompte. It is 10 miles from any other production.

### Texas' Colorado County well is completed

In Texas, Crescent Petroleum Corp. has completed a flowing discovery well on acreage in the Garwood area of Colorado County. The well, A-17 Brownson, was completed in the Bucksnag zone through perforations from 5,814-20 ft. On test, it flowed at the rate of 120 bbl. a day of 45°-gravity oil through a 10/64-in. choke. Tubing pressure was 425 psi. with a low gas-oil ratio.

This well is a south stepout from Crescent's recent Conroe zone discovery well. Additional development drilling is scheduled on the approximately 4,000 acres held in the area.

### East Texas field is extended

A 2-mile extension is made to Pokey field in southeastern Limestone County, East Texas.

Ralph Spence's 1 Spurlock, southwest of the field's discovery well, nearest producer, is productive of gas both from the Travis Peak, at 7,130-46 ft. and 7,193-7,200 ft., and the Pettet, at 6,824-30 ft.

The well is shut in for pipeline connection without potential gage. It cleaned through ¼-in. choke with tubing pressure of 600 psi.

The field,'s discovery well, also drilled by Spence, was completed in November 1959. It had open-flow potential of 4,700 M.c.f.d. of gas from pay at 7,084-97 ft.

### Panhandle strikes tap Morrow

Two Morrow sand discoveries highlighted developments in the Texas Panhandle.

In Lipscomb County, Pan American Petroleum Corp. 1 Beck unit "C" found new gas in the northeast part of the county. In southeastern Ochiltree County, Shamrock Oil & Gas Corp. 1 Mary T. Morrison et al. found gas, also in the Morrow.

Pan Am's discovery flowed 20 M.M.c.f.d. on a 24-hour gage from perforations at 8,278-8,886 ft. in the Morrow. Location is in Section 86, Block 10, HT&B Survey, 5 miles northeast of Follett town and ¾ mile east of Morrow gas at Follett field.

Shamrock's discovery flowed 9 M.M.c.f.d. from Morrow at 10,303-10,547 ft. Location is in the southeast part of the county.

**Childress County.** In the Palo Duro basin area in the southern Panhandle, British - American Oil Producing Co. 1-B Ida Coats, found good Canyon reef gas production. The well flowed up to 44 M.M.c.f.d. during drill-stem test at 4,609-13 ft. This well is a northwest offset to the one-well field at Kirkland Canyon reef, 11 miles east of Childress in Section 389, Block H, W&NW Survey.

### Borden County, West Texas bags new Pennsylvanian oil

A lower Pennsylvanian discovery was reported in northeastern Borden County in West Texas. The discovery well is Blair & Price 1 Koonsman.

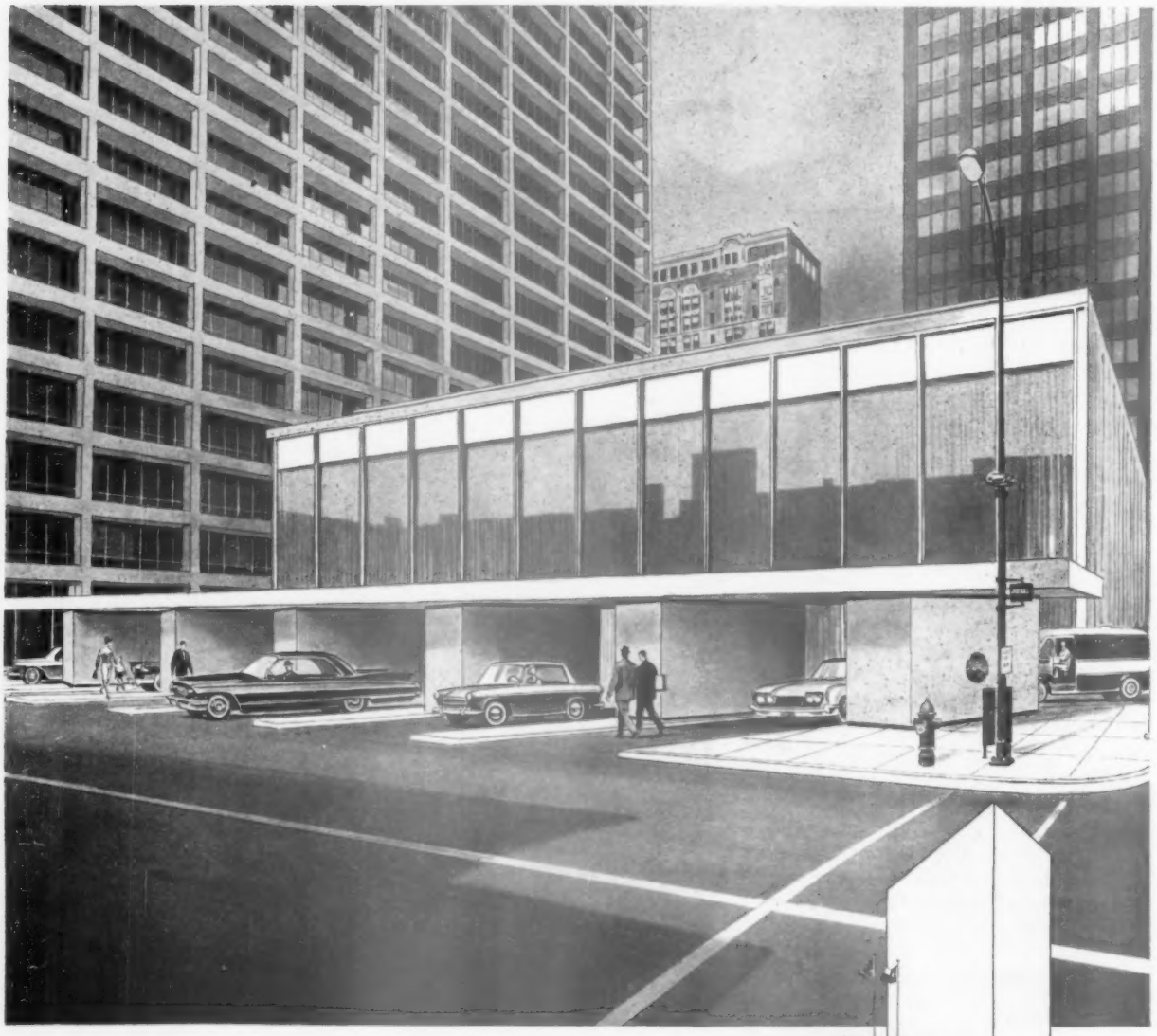
The well flowed 201 bbl. of oil per day from "A" zone perforations at 7,879-7,903 ft. Earlier, the well flowed 241 bbl. of oil per day on 24/64-in. choke from lower Pennsylvanian perforations at 8,209-17 ft. Location of the dual-zone discovery is in Section 26, Block 2, T&NO Survey, 12 miles northeast of Gail and ¾ mile south of Koonsman field.

**Crane County.** Bayview Oil Corp. 2-A Eppenauer, 12 miles southwest of Crane, was completed as an upper Glorieta pay discovery in Bayview-Glorieta and San Andres field. The well flowed 110 bbl. of oil per day on 12/64-in. choke, 41.7° gravity. Perforations were at 2,983-3,002 ft. Location is in Section 10, Block 6, H&TC Survey.

Gulf Oil Corp. 1 Jones et al. completed flowing 192 bbl. of oil daily on 16/64-in. choke to give the third well to McKee-Wolfcamp field in Crane County, 16 miles west of Crane. Location is in Section 12, Block 3, H&TC Survey. Perforations were at 5,448-54 ft.

# The most convenient motor bank in town

At the new First City National Bank every feature, from the width of the drives to the height of the tellers' windows, was planned to make this the easiest-to-use motor bank in town. There are six stations with plenty of "fender room," and a night depository if you drive in after hours. Every department of the new First City was designed to make banking here quick, easy and pleasant. It takes only a minute to open an account . . . why not stop in and join the "First family" of Houston this week.



*the new*
FIRST CITY NATIONAL BANK *of houston*

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Harold Decker . . . president of IPAA.

# Decker urges gas bill effort

## New IPAA president puts natural-gas legislation high on list of industry needs. Imports and depletion are also issues.

THE new president of the Independent Petroleum Association of America is an "industry man."

Harold Decker of Houston is a real workhorse in industry organizations, a respected promoter of oil's welfare.

Decker also has made his mark as an oil man. From roughnecking for the old Bravo Oil Co. in the 1920's to the presidency of Highland Oil Co., he is regarded as one of Houston's most competent and forward looking engineer-executives.

But he is best known for his association work. In fact, his election to the presidency of IPAA may pose a problem for the Mid-Continent Oil and Gas Association, which had laid plans informally to elect him to the presidency of that organization next year. He is now serving as its first vice president and should move up in 1962.

However, since the IPAA presidency usually last 2 years, Decker said last week he doubts the advisability of holding down two major industry jobs simultaneously.

Decker's other industry activities also indicate the high regard held for him by his associates. He has been an API director for several years, has been a vice president and director of AIME, and a director of the Texas Mid-Continent Oil and Gas Association.

In 1958 Decker was a leader in organizing the Oil Industry Conservation Forum, which sought to promote good conservation practices, such as wide well spacing. He was the group's Texas subcommittee chairman.

While the forum is quiescent today, Decker believes it served a good purpose in arousing the industry on an important issue and still expects support from oil men in Texas for a program of wide spacing—and proration incentive to match.

**His career.** Born in Chicago, the 58-year-old Decker grew up in Guthrie, Okla., as a jeweler's son.

He spent a year at Ohio's Kenyon College and then began studying civil engineering at the University of Oklahoma. When the university opened its now-famous petroleum engineering school the next year, Decker switched to petroleum engineering studies and was well equipped as an engineer when he went to work for Bravo in Houston in 1925—as a roustabout.

Engineers in those days were looked on with skepticism, but after a year he joined the old Marland Oil Co. in Houston in its petroleum engineering department.

Next came a short stop at Tidal Oil Co. (now Tidewater) and then 7 years with Skelly Oil in Tulsa, Seminole, Okla., and Houston. In 1937 he began an 8-year stint with Seaboard Oil Co. at Corpus Christi in charge of land and geological activities.

Then for 4 years he worked in executive capacities, including vice president, with the old Pan American companies (production, pipeline, and gas) in Houston.

Houston Oil Co. and Houston Pipe Line Co. tabbed him for their presidency in 1950.

When these companies were dissolved in 1956, the Herman and George Brown interests made him the president of their Highland Oil Co. in Houston. Highland handles the Brown partnership's oil interests.

Decker is a director of Halliburton, United Carbon, and East Texas Pulp & Paper, and the Texas National Bank.

**What's ahead for IPAA?** The deliberate, cigar-smoking Decker sees the battle to retain the depletion allowance as probably job No. 1 for the industry during 1962.

No stranger to speaking out for oil, Decker's voice should be an influential one in Washington. Not a rabble-rousing spokesman, Decker can be expected to present the cogent, sober arguments that win support.

The industry also must renew its battle for a natural-gas bill. To be effective, Decker believes it must present a solid front to Congress—and this means renewed efforts for the industry's task force to draft a bill acceptable to all segments and satisfactory to the administration.

As for imports, the IPAA will be dealing with that problem, too. In fact, Decker, in summing up for 1962, said it this way: "We've got problems; nothing but problems."

Besides electing Harold Decker (above) president for 1962, the IPAA named 14 new members to its executive committee and 16 new vice presidents.

New members of the executive committee are **W. T. Blackburn,** Denver; **C. J. Davidson,** Fort Worth; **F. Clinton Edwards,** Midland; **Jake L. Hamon,** Dallas; **Elmo Holder,**

## California Standard names new president

OTTO N. MILLER, 52, a chemical engineer who moved up through the refining ranks of Standard Oil Co. of California, last week became president of the company.

Miller succeeds T. S. Petersen, California Standard's president since 1948. Petersen is retiring at the age of 65 under the company's mandatory retirement program. R. Gwin Follis, chairman of the board, will continue as the company's chief executive officer.

The new president has been with the company 27 years, serving both in the domestic and foreign field. He has been a vice president of the company since 1954 and a director since 1959.

During the last 10 years, Miller has served successively as head of domestic refining operations; head of East Coast operations; a director of Caltex, a marketing and refining affiliate in more than 70 countries; and special assistant to the president in charge of special problems.

Miller's career with Standard of California began in 1934 when he joined the company as a researcher at the El Segundo refinery in Los Angeles. Twelve years later he was named general manager of manufacturing. Among his refining assignments was a 3-year wartime hitch with Arabian American Oil Co. during which the big Ras Tanura refinery was built.

A native of Iowa, Miller took his undergraduate work at Iowa State College. He received his PhD. in chem engineering from the University of Michigan and received Michigan's "Distinguished Alumni Citation" in 1953.

OTTO N. MILLER

Evansville, Ind.; **J. Stuart Hunt,** Dallas; **J. C. Hunter, Jr.,** Abilene, Tex.; **George C. Martin,** Oklahoma City; **T. M. Martin,** El Dorado, Ark.; **Patrick J. McDonough,** Billings, Mont.; **E. Bruce Street,** Graham, Tex.; **H. A. True, Jr.,** Casper, Wyo.; **W. M. Vaughey,** Jackson, Miss.; and **Watson W. Wise,** Tyler, Tex.

New vice presidents are **Glenn C. Ferguson,** Bakersfield, Calif.; **Floyd Collins,** Mount Vernon, Ill.; **Robert F. Eberle,** Evansville; **Fred I. Murfin,** Wichita; **Alfred E. Beasley,** Monroe, La.; **Frank M. Ritchie,** New Orleans; **Robert L. Reed,** New York; **Herbert G. Officer,** Bismarck, N. D.; **W. E. Shrider,** Newark, Ohio; **S. M. Anderson, Jr.,** Oklahoma City; **George A. Wilson,** Dallas; **C. C. Coulston,** Tyler, Tex.; **J. W. Starr,** Midland; **William S. Kilroy,** Houston; **R. S. McKnight,** Salt Lake City; and **H. B. Gernert,** Casper.

British American Oil Co. has announced five key appointments in its manufacturing department head office in Toronto. **R. C. Beal,** formerly chief engineer, has been named manager of engineering. **R. O. Campbell,** formerly chief chemist, was appointed manager of product development. **R. E. Harris,** who was manager of the Edmonton refinery, was promoted to manager of planning and services. **R. D. Meagher,** formerly assistant manager at Calgary refinery, moved up to coordinator of mechanical engineering. **S. K. McWalter,** formerly operating superintendent at Port Moody refinery, has become coordinator of process engineering.

**Bill M. Mowrey** has joined the conservation department of the Oklahoma Corporation Commission, Oklahoma City, as petroleum engineer.

New officers of the New Mexico Petroleum Industries Committee are: **Sam J. McKim,** Gulf Oil Corp., Albuquerque, chairman; **Ross Madole,** Mobil Oil Co., Dallas, and **Ray Ely,** Cities Service Petroleum Co., Hobbs, N. M., vice chairmen; **Wilson Frost,** Continental Oil Co., Albuquerque, treasurer.

**G. L. Brennan,** a senior vice president of Warren Petroleum Corp., retired November 1 after 20 years with the company. He also resigned from the board of directors of Dixie Pipe Line Co. Brennan joined Warren in 1941 as manager of the LPG division. He became vice president of the division in 1954 and a director in 1956. Brennan resigned from the Warren board of directors last June preparatory to his approaching retirement. He was a director of the Liquefied Petroleum Gas Association and of the National LP-Gas Council.

**Richard B. Hickman,** production engineer for Humble Oil & Refining Co., has transferred to Dallas from Wichita Falls, Tex.

**D. C. Wixson,** administrative vice president of DX Sunray Oil Co., Tulsa, has retired after 35 years of service. He is incorporating a personal family investment company with offices in Tulsa.

**Dr. B. F. Armendt** has been promoted to senior research specialist in Humble Oil & Refining Co.'s research and development laboratory at Baytown, Tex.

Continental Oil Co. has realigned its eight-state Southwest marketing region into two expanded divisions and six districts. A division headquarters in Fort Worth will handle marketing in Texas. The New Orleans division office will supervise marketing in Arkansas, Alabama, Oklahoma, Mississippi, Tennessee, and part of Florida. **Dean L. McGregor** and **E. G. Hoover,** managers of the New Orleans and Fort Worth divisions, respectively, have been promoted to managers of their expanded territories. Named district managers are **Paul A. Ford,** Fort Worth; **T. R. Abernathy,** Oklahoma City; **Elmo Blalock,** Little Rock; **H. P. Dodson,** New Orleans; **Van N. Mayhall,** Lubbock; and **W. E. Biggerstaff,** Houston.

MUELLER

ECK

Monsanto Chemical Co. has announced the election of a new member to the board of directors and appointment of a new vice president. **Robert K. Mueller** of St. Louis, a vice president, was elected to the board and to the executive committee. **John R. Eck** of St. Louis becomes a vice president and succeeds Mueller as general manager of the company's plastics division.

BIBLE

REESE

Monsanto Chemical Co. has created a new division which combines its petroleum-based-chemical operations. It includes the Chocolate Bayou chemical refinery under construction near Alvin, Tex., Monsanto's plant at Texas City, Tex., and the Lion Oil Co. Monsanto vice president **H. Harold Bible,** St. Louis, general manager of the former Lion Oil division, is general manager of the newly formed hydrocarbons division. **F. E. Reese,** Texas City, assistant general manager of the plastics division, is Bible's assistant.

**J. F. M. Taylor** has joined Golden Eagle Refining Co. of Panama, Inc., as vice president in charge of manufacturing. He formerly was a consultant at Napa, Calif.

**G. A. Wilson** has transferred to Fort Worth as coordinator of natural-gas activities in Continental Oil Co.'s southwestern region headquarters. He formerly was coordinator of natural-gas activities at Houston. At Fort Worth, Wilson succeeds **L. W. Miller,** recently transferred to Conoco's headquarters production staff in Houston.

New administrative appointments at British American Oil Co.'s Clarkson refinery include: assistant manager, **J. L. Stoik,** formerly assistant refinery manager at Moose Jaw; manager of pumping and blending, **H. A. Hornfelt,** formerly assistant manager at Port Moody; manager of engineering and maintenance, **G. C. Docken,** formerly the manufacturing department's head mechanical engineer in Toronto; manager of operations, **K. R. Evans,** formerly operating superintendent at Clarkson.

**John H. Wiese** has been promoted to supervisor of geologic research for Richfield Oil Corp.'s production research division, Anaheim, Calif. He formerly was Rocky Mountain division geologist with Richfield at Casper, Wyo.

**Dr. E. C. H. Lammers** has been appointed technical assistant to the vice president in the oil field research department of California Research Corp. Lammers formerly was division geologist in Standard Oil of California's western operations.

**Donald W. Jackson,** former manager of drilling and production for Panhandle Eastern Pipeline Co., has opened consulting offices in Liberal, Kans. He specializes in drilling, completion and workover supervision, development investigations, and property management service.

**J. A. Gordon,** Union Oil Co., Santa Fe Springs, Calif., has been awarded the California Natural Gasoline Association's award for meritorious service, the association's top award. Gordon received the award at the recent CNGA annual meeting in Long Beach. Receiving "Sam awards" for service to the association were: **G. C. Elmore,** Tidewater Oil Co., Ventura; **Linn Livingston,** Continental Oil Co., Ventura; **A. A. Quarstrom,** Richfield Oil Corp., Bakersfield; and **L. E. Woodruff,** Texaco Inc., Los Angeles.

**F. L. Johnson,** who has been head process engineer in Toronto for the manufacturing department of British American Oil Co., has been named assistant manager of the company's Montreal refinery. He succeeds **F. F. Atkinson,** recently transferred to crude and products supply department in Toronto.

**Paul R. Schultz,** president of Blackwell Oil & Gas Co., Tulsa, has been named a consultant to the Senate Interior Committee for the forthcoming national fuels-policy study. Sen. Clinton P. Anderson (D.-N. M.), committee chairman, announced Schultz' appointment last week at the Independent Petroleum Association of America convention at Houston. The sale of Blackwell to Calvert Exploration Co., Tulsa, and Mid-America Minerals, Inc., Oklahoma City, is to be completed around December 1, leaving Schultz free to take in the Washington post. He will serve the committee without pay.

**R. M. Donald,** formerly assistant manager of British American Oil Co.'s Edmonton refinery, has been promoted to plant manager. New assistant manager is **J. W. Thomas,** formerly at Toronto in charge of production control for B-A's refineries in eastern Canada.

**John B. Clark** has been appointed senior research supervisor at the Whiting, Ind., laboratories of American Oil Co.

**H. E. Walker** has been named superintendent of Shell Oil Co.'s Houston refinery. He replaces **J. B. St. Clair,** who has accepted a temporary overseas assignment with the company. Walker has been assistant manager in the head office manufacturing technological department.

Ohio Oil Co. has named **Francis C. Moriarty** manager of domestic refining. He had been vice president of manufacturing for Aurora Gasoline Co., an Ohio Oil subsidiary. In his new job, Moriarty will be responsible for operations of Ohio Oil refineries located at Robinson, Ill., and Muskegon and Detroit, Mich. Moriarty joined Aurora in 1950 and became a vice president in 1952.

NICKERSON WILLETTS MOORE

## Mobil promotes three top executives

ALBERT L. NICKERSON has been elected chairman of the Socony Mobil Oil Co. board of directors, succeeding Fred W. Bartlett, who retired.

Nickerson, president of Socony Mobil since 1955 and chief executive officer since 1958, will continue as chief executive officer.

Herbert Willetts succeeds Nickerson as president. For the past 2½ years, Willetts has been an executive vice president of Socony Mobil and president of its Mobil Oil Co. division, which conducts all Socony Mobil operations in the U. S. and Canada.

Fred H. Moore was elected a director and an executive vice president of Socony Mobil. He also succeeds Willetts as president of Mobil Oil Co. Moore was executive vice president of Mobil Oil.

Nickerson joined Socony Mobil in 1933 and held various positions in domestic marketing, becoming New England division manager in 1941. He became a director and executive in charge of domestic marketing in 1946.

Willetts, who has been with Socony Mobil 38 years, was promoted to general manager of marketing in 1947. He was elected director in charge of domestic marketing in 1951 and a vice president in 1953.

Moore started in 1935 as a geologist for Magnolia Petroleum Co., former Mobil affiliate in the Southwest. He has held several executive positions with Magnolia and Mobil Oil.

Bartlett had been chairman of Socony Mobil since 1958. He joined the company in 1939, held several executive positions in the producing department, was elected a director 1957.

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**Donald C. Walker** has joined Tenneco Oil Co. in Lafayette, La., as a petroleum engineer.

**William M. Riddle** has been named chief geologist for Oklahoma Natural Gas Co.

**F. E. Williams,** formerly petroleum engineer for Texaco Inc. at Casper, Wyo., has joined the U. S. Bureau of Mines at Laramie, Wyo.

**E. Morris Seydell,** Seydell Operating Co., Wichita Falls, Tex., was elected president of the National Stripper Well Association at the group's annual meeting last week in Houston. He will succeed **W. M. Shoemaker,** of Bradford, Pa., on January 1. **J. R. Lavens, Jr.,** Evansville, Ind., was elected first vice president, and **George Bruce,** Wichita, Kans., was named second vice president.

Southwest Gas Producing Co., Inc., Monroe, La., has announced three promotions. **Fred H. Plitt,** formerly senior petroleum engineer, becomes chief engineer. **Richard C. Guerriero,** formerly a junior engineer, was elevated to projects engineer. **Ralph H. Kilgore,** formerly district engineer of the Dubach, La., district, was named assistant district superintendent. **Joseph H. Hawkins** has joined the company as geologist in the South Louisiana district office, Lafayette.

**D. G. Berry,** formerly assistant manager of British American Oil Co.'s Clarkson refinery, has become assistant manager of B-A's Port Moody refinery. Other B-A refinery personnel changes include: **K. C. Reeves,** formerly mechanical superintendent at Moose Jaw, now assistant refinery manager; **H. B. Scott,** formerly refinery operations control administrator at Clarkson, now assistant manager at Calgary.

**Kenneth D. Luff,** formerly a geologist at Denver for Humble Oil & Refining Co., has opened consulting offices in Denver.

**Adm. Arleigh Burke** has been elected to the board of directors and a member of the executive committee of Texaco Inc. Burke retired last August as U. S. chief of naval operations after 42 years of service in the Navy.

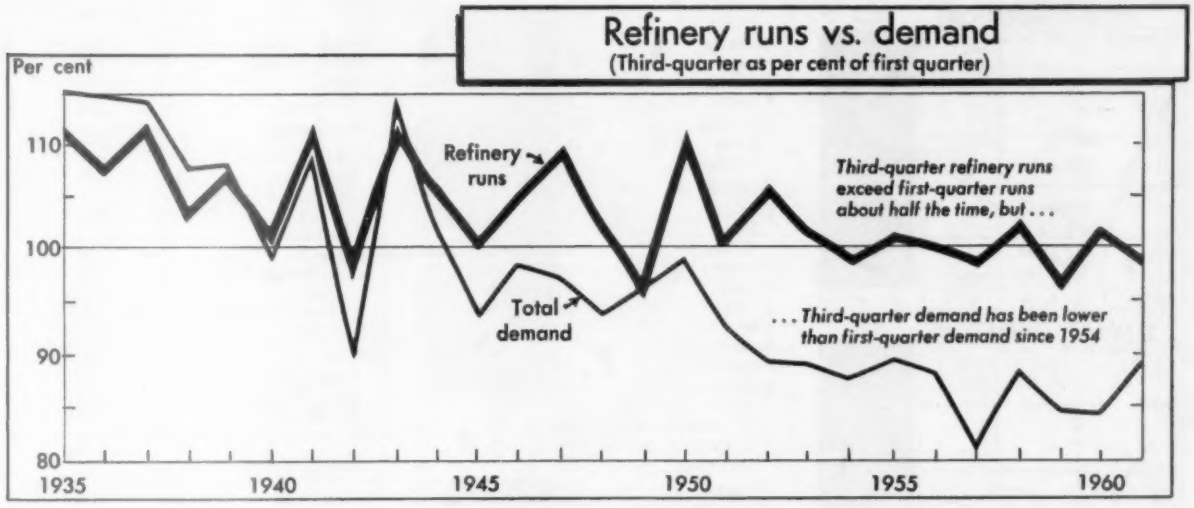
**Fletcher Farrar,** president of the Illinois Oil and Gas Association, is a new member of the Illinois Oil and Gas Board.

Alco Oil & Chemical Corp., Philadelphia, has appointed **Dr. Thomas F. Jacoby** assistant technical director. He replaces **C. E. Cain,** recently named sales manager.

New officers of the Intermountain Association of Petroleum Geologists are: **Stanley D. Conrad,** Richfield Oil Corp., president; **Lyle A. Hale,** Mountain Fuel Supply Co., vice president; **William W. Sloan,** Humble Oil & Refining Co., second vice president; **Karl F. Kennedy,** Gulf Oil Corp., treasurer; **J. Phillip Brogan,** California Oil Co., western division, secretary.

**A. Mitchell Belchic** has joined Bank of the Southwest, Houston, as manager of the oil and gas section. He formerly was manager of field operations and exploration for Belgam Oil Co., Shreveport, La.

**James F. Overton, Jr.,** has been promoted to area gas engineer for Shell Oil Co.'s New Orleans area. He succeeds **Richard Porter,** who has been transferred to Shell's Midland exploration and production area. Overton has worked in the company's gas departments in Texas and in the New York head office.




# How to cut your profits

BY JOHN C. CASPER

CURRENT seasonal changes in refinery runs do not follow changes in demand as closely as they did in past years. The primary effect of this shift has been larger fluctuations in refined-product stocks. The secondary effect has been increased pressure on product prices.

The chart shows broad changes in seasonal adjustments of refinery runs and comparisons with seasonal changes in demand.

Lines on the chart represent ratios of demand and runs with data for the first quarter each year divided by data for third quarter.

Anytime a line is in the upper half of the chart, it shows that the third-quarter total was larger than total for the first. Conversely, lines in the lower half show that first-quarter totals are larger than totals for the third quarter.

Back in 1935, total demand in the third quarter was 115% of demand in the first quarter. For that same year, third-quarter runs topped first-quarter runs by 11%. The plot point is 111. It was 1940 before first-quarter demand climbed to the level of the third quarter.

Demand ratios for the early years of the graph were above the center line because demand was dominated by sales of gasoline, and gasoline demand was at a peak during the summer months. Gasoline demand accounted for 43.9% of total demand in 1953. Distillate demand, which reaches a peak during the winter quarters, represented only 9.2% of total demand that year. Demand during the thirties tended to climb during the summer months when gasoline sales were high.

Third-quarter demand has been lower than first-quarter demand since 1944. This fact shows up on the chart with the demand line in the bottom half of the chart every year after 1944. The low point was in 1957 when first-quarter demand was only 81.2% of demand in the third quarter.

Third-quarter refinery runs have exceeded first-quarter runs about half the time over the past 12 years. Note that the line for refinery runs zigzags along the center of the chart.

In the early years of the chart, refinery runs tended to follow demand, but in recent years refiners have clung to the old policy of high runs in the third quarter despite the fact that there has been a definite change in the seasonal pattern of demand.

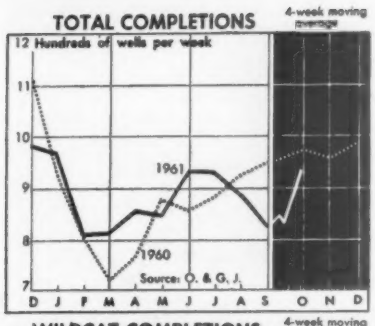
Financial statements for 1961 will record the fact that it doesn't pay to set peak refinery runs for the low-demand summer season.

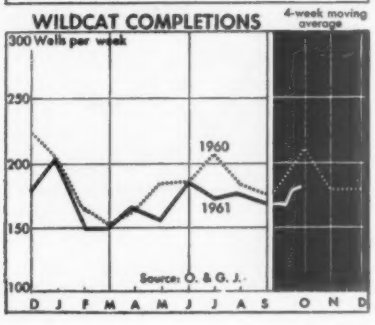
Here is the unbroken chain of events: high runs; excessive product supply; surplus inventories; distress sales of products; price wars; lower realization; and reduced profits.

## A quick look at the highlights . . .

| | LATEST WEEK | Change from WEEK AGO | | Change from YEAR AGO | |
|---|---|---|---|---|---|
| Production | 7,132,330 | UP | 17,270 | UP | 161,378 |
| Crude stocks | 250,606,000 | DOWN | 1,351,000 | UP | 20,790,000 |
| Completions | 983 | DOWN | 19 | UP | 12 |
| Refinery runs | 8,146,000 | DOWN | 219,000 | UP | 212,000 |
| Gasoline stocks | 183,178,000 | DOWN | 2,127,000 | DOWN | 3,637,000 |
| Kerosine stocks | 36,836,000 | UP | 351,000 | UP | 210,000 |
| Distillate stocks | 177,091,000 | UP | 4,134,000 | DOWN | 1,833,000 |
| Residual stocks | 49,940,000 | DOWN | 468,000 | UP | 23,000 |
| Four-product stock | 447,045,000 | UP | 1,890,000 | DOWN | 5,237,000 |
| Total imports | 1,635,200 | DOWN | 100,700 | UP | 116,600 |

# Drilling




## Active rotary rigs

| | 10-30-61 | 10-23-61 | 10-31-60 |
|---|---|---|---|
| Alabama | 6 | 6 | 1 |
| Alaska | 11 | 10 | 7 |
| Arkansas | 18 | 15 | 12 |
| Arizona | 3 | 3 | 2 |
| California | 96 | 100 | 70 |
| Land | 93 | 95 | 67 |
| Offshore | 3 | 5 | 3 |
| Colorado | 27 | 27 | 54 |
| Florida | 1 | 1 | 3 |
| Land | 0 | 0 | 2 |
| Offshore | 1 | 1 | 1 |
| Georgia | 0 | 0 | 1 |
| Illinois | 40 | 46 | 47 |
| Indiana | 7 | 8 | 10 |
| Iowa | 1 | 1 | 1 |
| Kansas | 112 | 109 | 105 |
| Kentucky | 9 | 9 | 4 |
| Louisiana | 264 | 271 | 271 |
| North | 38 | 47 | 33 |
| S. Inland waters | 99 | 93 | 104 |
| S. Land | 75 | 78 | 75 |
| Offshore | 52 | 53 | 59 |
| Michigan | 20 | 22 | 26 |
| Mississippi | 69 | 66 | 57 |
| Missouri | 2 | 2 | 1 |
| Montana | 21 | 24 | 28 |
| Nebraska | 21 | 19 | 24 |
| Nevada | 1 | 1 | 0 |
| New Mexico | 104 | 100 | 97 |
| New York | 2 | 2 | 2 |
| North Carolina | 1 | 1 | 0 |
| North Dakota | 12 | 12 | 17 |
| Ohio | 7 | 7 | 5 |
| Oklahoma | 187 | 194 | 166 |
| Pennsylvania | 5 | 7 | 6 |
| South Dakota | 1 | 2 | 0 |
| Texas | 653 | 625 | 569 |
| S. Inland waters | 12 | 11 | 8 |
| S. Land | 187 | 190 | 141 |
| Offshore | 0 | 0 | 1 |
| North | 57 | 56 | 38 |
| Panhandle | 46 | 48 | 48 |
| East | 65 | 59 | 56 |
| West Central | 164 | 153 | 167 |
| West | 122 | 108 | 110 |
| Utah | 43 | 46 | 30 |
| Washington | 0 | 0 | 1 |
| West Virginia | 12 | 12 | 9 |
| Wisconsin | 0 | 0 | 1 |
| Wyoming | 64 | 68 | 76 |
| Total U. S. | 1,820 | 1,816 | 1,703 |
| Cum. avg. to date | 1,728 | 1,726 | 1,733 |
| Western Canada | 144 | 155 | 142 |
| Eastern Canada | 1 | 1 | 1 |
| Grand total | 1,965 | 1,972 | 1,846 |

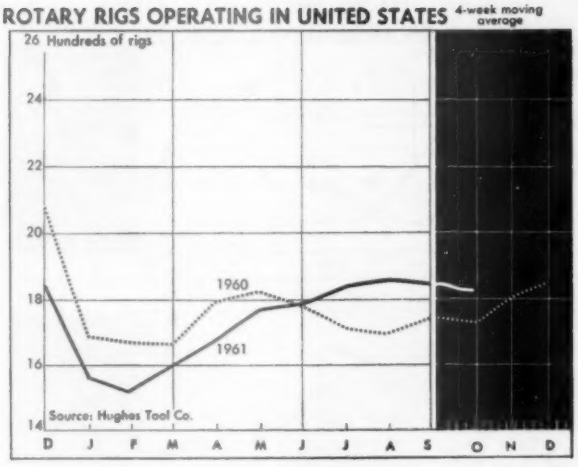
Hughes Tool Co. report.

## Weekly well completions . . . Week ended October 28, 1961

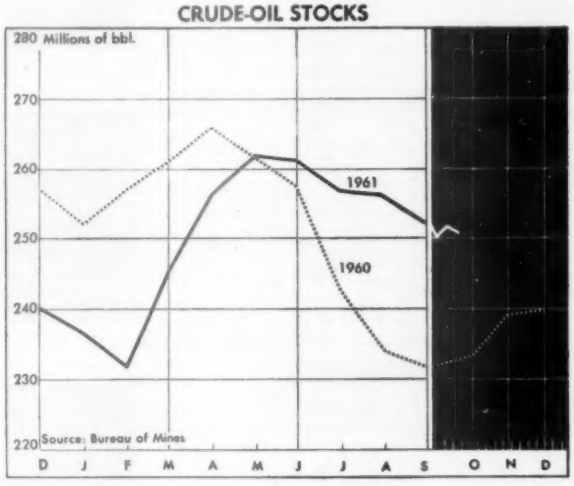
| | Total wells | | | | | | | Cum. | | Total wildcats | | | | | Cum. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Crude | Cond. | Gas | Dry | Service | Footage | 1961 | 1960 | Total | Crude | Cond. | Gas | Dry | 1961 | 1960 |
| Arkansas | 9 | 3 | 0 | 0 | 6 | 0 | 41,931 | 423 | 498 | 2 | 0 | 0 | 0 | 2 | 90 | 127 |
| California | 46 | 30 | 0 | 5 | 11 | 0 | 285,877 | 1,481 | 1,374 | 7 | 0 | 0 | 0 | 7 | 224 | 252 |
| Colorado | 13 | 1 | 1 | 4 | 7 | 0 | 64,910 | 540 | 527 | 4 | 0 | 0 | 1 | 3 | 244 | 272 |
| Illinois | 102 | 11 | 0 | 0 | 18 | 73 | 235,720 | 1,705 | 1,905 | 11 | 1 | 0 | 0 | 10 | 382 | 403 |
| Indiana | 21 | 8 | 0 | 0 | 12 | 1 | 34,537 | 627 | 878 | 5 | 0 | 0 | 0 | 5 | 168 | 320 |
| Kansas | 83 | 36 | 0 | 6 | 33 | 8 | 202,941 | 4,018 | 3,298 | 15 | 2 | 0 | 1 | 12 | 736 | 874 |
| Kentucky | 33 | 6 | 0 | 13 | 12 | 2 | 68,586 | 1,569 | 1,770 | 1 | 0 | 0 | 0 | 1 | 105 | 186 |
| Louisiana | 85 | 40 | 0 | 14 | 31 | 0 | 706,633 | 3,145 | 2,998 | 14 | 1 | 0 | 0 | 13 | 530 | 464 |
| North | 33 | 17 | 0 | 3 | 13 | 0 | 134,372 | 1,314 | 1,145 | 4 | 0 | 0 | 0 | 4 | 251 | 222 |
| South | 48 | 23 | 0 | 11 | 14 | 0 | 525,962 | 1,386 | 1,438 | 7 | 1 | 0 | 0 | 6 | 232 | 214 |
| Offshore | 4 | 0 | 0 | 0 | 4 | 0 | 46,299 | 445 | 415 | 3 | 0 | 0 | 0 | 3 | 47 | 28 |
| Michigan | 13 | 2 | 0 | 1 | 10 | 0 | 38,987 | 654 | 781 | 5 | 0 | 0 | 0 | 5 | 238 | 213 |
| Mississippi | 11 | 1 | 0 | 1 | 9 | 0 | 112,792 | 447 | 568 | 4 | 0 | 0 | 0 | 4 | 158 | 218 |
| Montana | 2 | 0 | 0 | 0 | 2 | 0 | 8,922 | 328 | 274 | 1 | 0 | 0 | 0 | 1 | 157 | 128 |
| Nebraska | 17 | 3 | 0 | 0 | 14 | 0 | 78,930 | 813 | 734 | 12 | 0 | 0 | 0 | 12 | 403 | 318 |
| New Mexico | 43 | 14 | 0 | 16 | 13 | 0 | 218,944 | 1,507 | 1,553 | 5 | 0 | 0 | 0 | 5 | 246 | 220 |
| West | 20 | 0 | 0 | 15 | 5 | 0 | 95,873 | 657 | 552 | 2 | 0 | 0 | 0 | 2 | 80 | 61 |
| East | 23 | 14 | 0 | 1 | 8 | 0 | 123,071 | 850 | 1,001 | 3 | 0 | 0 | 0 | 3 | 166 | 159 |
| North Dakota | 2 | 1 | 0 | 0 | 1 | 0 | 8,554 | 210 | 248 | 1 | 0 | 0 | 0 | 1 | 58 | 68 |
| Ohio | 43 | 26 | 0 | 10 | 7 | 0 | 109,381 | 877 | 891 | 1 | 0 | 0 | 0 | 1 | 36 | 44 |
| Oklahoma | 137 | 80 | 2 | 5 | 27 | 23 | 397,012 | 4,756 | 3,814 | 2 | 0 | 0 | 0 | 2 | 446 | 591 |
| Texas | 284 | 145 | 1 | 45 | 84 | 9 | 1,381,141 | 11,860 | 12,989 | 62 | 6 | 1 | 6 | 49 | 2,520 | 2,677 |
| Dist. 1 | 27 | 14 | 0 | 0 | 13 | 0 | 57,789 | 760 | 926 | 7 | 0 | 0 | 0 | 7 | 305 | 337 |
| Dist. 2 | 9 | 4 | 0 | 3 | 2 | 0 | 57,362 | 622 | 635 | 4 | 1 | 0 | 2 | 1 | 187 | 157 |
| Dist. 3 | 27 | 13 | 0 | 5 | 9 | 0 | 187,517 | 935 | 986 | 5 | 0 | 0 | 1 | 4 | 184 | 187 |
| Dist. 4 | 40 | 12 | 0 | 19 | 9 | 0 | 280,444 | 1,005 | 888 | 11 | 2 | 0 | 2 | 7 | 264 | 246 |
| East | 11 | 6 | 1 | 0 | 4 | 0 | 74,078 | 960 | 1,063 | 3 | 0 | 1 | 0 | 2 | 250 | 223 |
| Dist. 7-B | 25 | 15 | 0 | 2 | 7 | 1 | 88,850 | 1,472 | 1,868 | 5 | 1 | 0 | 0 | 4 | 408 | 527 |
| West | 69 | 44 | 0 | 7 | 16 | 2 | 369,596 | 2,966 | 3,320 | 15 | 2 | 0 | 1 | 12 | 583 | 515 |
| Dist. 9 | 49 | 28 | 0 | 0 | 17 | 4 | 144,684 | 2,169 | 2,429 | 7 | 0 | 0 | 0 | 7 | 237 | 435 |
| Dist. 10 | 27 | 9 | 0 | 9 | 7 | 2 | 120,821 | 971 | 874 | 5 | 0 | 0 | 0 | 5 | 102 | 50 |
| Utah | 5 | 0 | 0 | 3 | 2 | 0 | 33,765 | 203 | 193 | 1 | 0 | 0 | 0 | 1 | 92 | 72 |
| West Virginia | 15 | 2 | 0 | 10 | 3 | 0 | 33,383 | 816 | 652 | 0 | 0 | 0 | 0 | 0 | 7 | 7 |
| Wyoming | 16 | 4 | 1 | 1 | 10 | 0 | 71,532 | 800 | 873 | 10 | 0 | 1 | 0 | 9 | 305 | 358 |
| Miscellaneous* | 3 | 1 | 0 | 0 | 2 | 0 | 20,494 | 1,190 | 1,080 | 2 | 0 | 0 | 0 | 2 | 238 | 207 |
| Total U. S. | 983 | 414 | 5 | 134 | 314 | 116 | 4,154,972 | 37,969 | 37,898 | 165 | 10 | 2 | 8 | 145 | 7,383 | 8,019 |
| Previous week | 1,002 | 452 | 3 | 136 | 371 | 40 | 4,085,456 | | | 196 | 14 | 0 | 12 | 170 | | |
| Cum. 1961 | 37,969 | 17,019 | 706 | 3,886 | 13,742 | 2,616 | 154,379,531 | | | 7,383 | 651 | 79 | 335 | 6,318 | | |
| Cum. 1960 | 37,898 | 17,099 | 1,108 | 3,117 | 14,464 | 2,110 | 157,201,879 | | | 8,019 | 724 | 87 | 270 | 6,938 | | |
| Western Canada | 40 | 21 | 0 | 8 | 11 | 0 | 182,856 | 1,854 | 1,904 | 9 | 0 | 0 | 2 | 7 | 442 | 508 |

*Mo., Ala., Alaska.

ROTARY RIGS OPERATING IN UNITED STATES 4-week moving average




CRUDE-OIL STOCKS




## Crude-oil stocks by states of origin*

(Thousands of barrels)

| | 10-21-61 | 10-14-61 | 10-22-60 |
|---|---|---|---|
| Pennsylvania | 2,337 | 2,290 | 2,345 |
| Other Appalachian | 1,478 | 1,481 | 1,479 |
| Illinois, Indiana, Michigan | 9,350 | 10,068 | 8,538 |
| Nebraska and North Dakota | 3,159 | 3,441 | 2,626 |
| Kansas | 9,237 | 9,002 | 8,514 |
| Oklahoma | 16,481 | 16,681 | 15,083 |
| Arkansas | 1,538 | 1,674 | 1,746 |
| Louisiana | 20,887 | 20,365 | 17,480 |
| North | 3,350 | 3,375 | 3,039 |
| South | 17,537 | 16,990 | 14,441 |
| Mississippi, Alabama, Florida | 4,012 | 3,916 | 1,905 |
| New Mexico | 9,101 | 9,096 | 8,433 |
| Texas | 107,137 | 107,695 | 97,372 |
| East Texas | 8,151 | 7,814 | 7,496 |
| West Texas | 48,303 | 47,714 | 47,123 |
| Texas Gulf | 18,125 | 19,836 | 17,025 |
| Other Texas | 32,558 | 32,331 | 25,728 |
| Wyoming | 16,425 | 16,083 | 14,714 |
| Other Rocky Mountain | 9,817 | 9,944 | 9,555 |
| California | 24,525 | 24,305 | 25,575 |
| Foreign | †15,122 | 15,916 | 14,451 |
| Total | **250,606** | 251,957 | 229,816 |

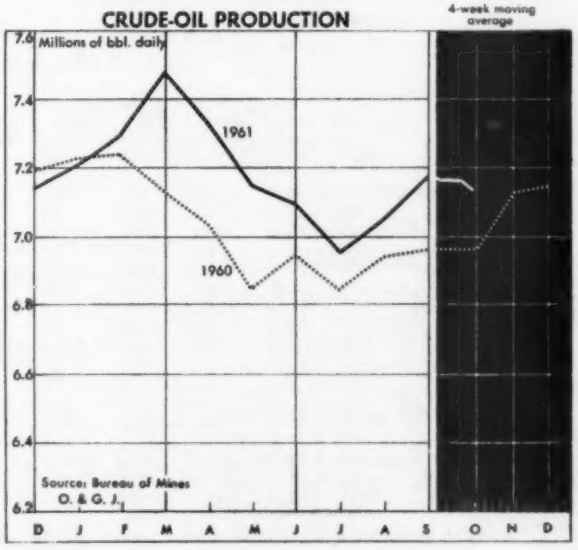
*Bureau of Mines. †Includes 4,604,000 bbl. in California.

## Daily average production for week

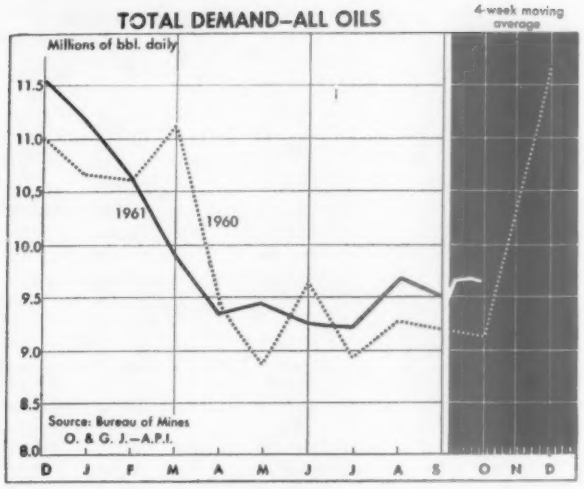
| | October 28, 1961 Crude oil | Lease condensate | Total | Oct. 21 total |
|---|---|---|---|---|
| Alabama | 17,000 | | 17,000 | 16,900 |
| Alaska | 23,600 | | 23,600 | 23,800 |
| Arkansas | 74,030 | 120 | 74,150 | 73,550 |
| California | 815,100 | | 815,100 | 814,000 |
| Colorado | 127,900 | | 127,900 | 126,300 |
| Eastern | 40,900 | | 40,900 | 39,000 |
| Florida | 900 | | 900 | 900 |
| Illinois | 216,200 | | 216,200 | 200,300 |
| Indiana | 31,200 | | 31,200 | 31,400 |
| Kansas | †310,955 | | †310,955 | †308,760 |
| Kentucky | 51,700 | | 51,700 | 52,100 |
| Louisiana | 1,025,850 | 158,475 | 1,184,325 | 1,184,400 |
| North | 101,300 | 6,200 | 107,500 | 107,575 |
| South | 924,550 | 152,275 | 1,076,825 | 1,076,825 |
| Michigan | 52,500 | | 52,500 | 52,200 |
| Mississippi | 146,000 | 4,100 | 150,100 | 150,100 |
| Montana | 88,400 | | 88,400 | 89,500 |
| Nebraska | 71,400 | | 71,400 | 72,000 |
| Nevada | 400 | | 400 | 400 |
| New Mexico | 308,000 | 7,500 | 315,500 | 315,500 |
| North Dakota | 62,100 | | 62,100 | 60,400 |
| Oklahoma | †505,800 | | †505,800 | †507,100 |
| Texas | 2,405,000 | 92,000 | 2,497,000 | 2,497,000 |
| Dist. 1 | 43,000 | 2,800 | 45,800 | 45,800 |
| Dist. 2 | 103,000 | 8,000 | 111,000 | 111,000 |
| Dist. 3 | 305,000 | 38,000 | 343,000 | 343,000 |
| Dist. 4 | 176,000 | 13,500 | 189,500 | 189,500 |
| Dist. 5 | 26,000 | 700 | 26,700 | 26,700 |
| Dist. 6 | 115,000 | 8,500 | 123,500 | 123,500 |
| East Texas field | 126,000 | | 126,000 | 126,000 |
| Dist. 7-B | 125,000 | 450 | 125,450 | 125,450 |
| Dist. 7-C | 106,000 | 3,550 | 109,550 | 109,550 |
| Dist. 8 | 980,000 | 12,000 | 992,000 | 992,000 |
| Dist. 9 | 194,000 | 2,500 | 196,500 | 196,500 |
| Dist. 10 | 106,000 | 2,000 | 108,000 | 108,000 |
| Utah | 91,600 | | 91,600 | 92,800 |
| Wyoming | 403,000 | | 403,000 | 406,100 |
| Others | ‡600 | | ‡600 | ‡550 |
| Total U. S. | 6,870,135 | 262,195 | **7,132,330** | 7,115,060 |
| Change from prev. week, up | | | **17,270** | |
| Canada | †626,400 | †17,500 | †643,900 | †654,700 |
| Total U. S. prod.—Jan. 1-Oct. 28 | | | | 2,162,966,700 bbl. |
| Same period last year (crude plus cond.) | | | | *2,118,146,100 bbl. |

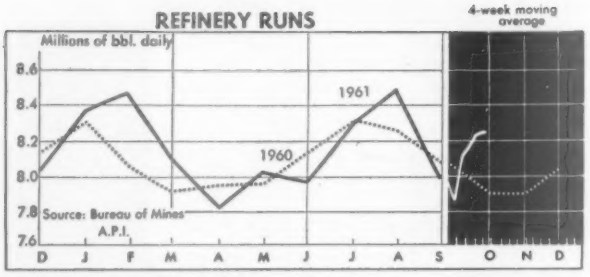
*Includes 68,034,900 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Arizona.

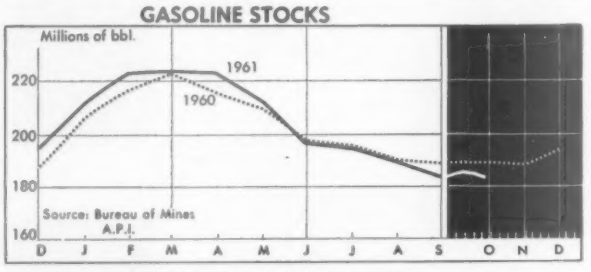
CRUDE-OIL PRODUCTION 4-week moving average

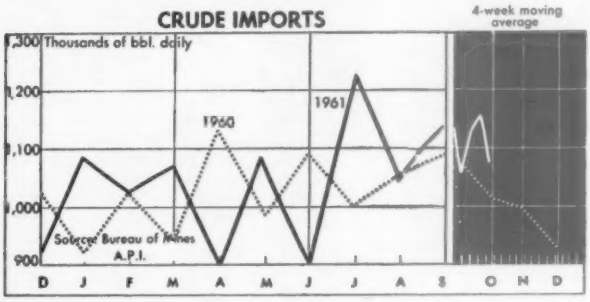


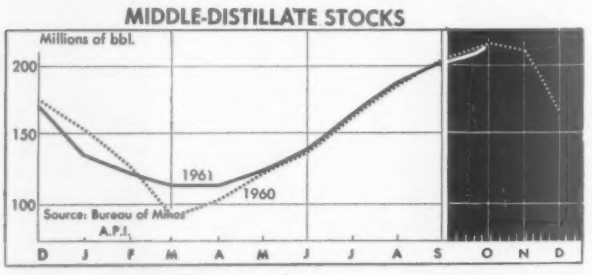
# Refining

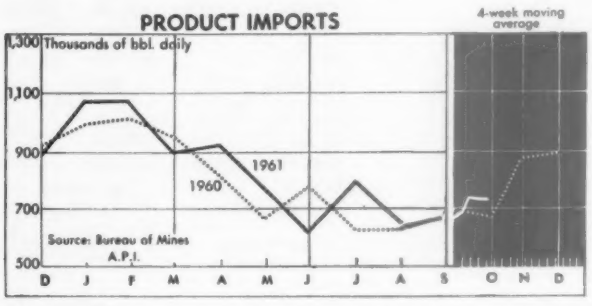


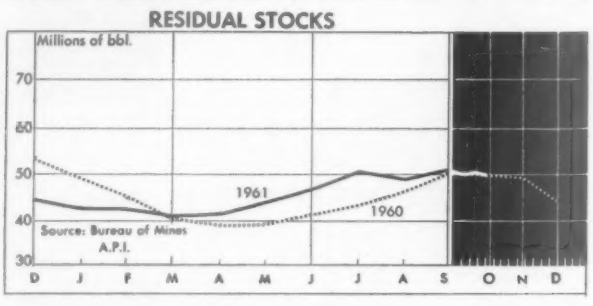




## API refinery report—October 27, 1961

(Thousands of barrels)

| District— | Daily avg. runs | Daily average production Gaso.* | Kero. | Dist. | Resid. | Stocks‡ Gaso.† | Kero. | Dist. | Resid. | Bureau of Mines, October 1960 Daily avg. runs | Daily average production Gaso.* | Kero. | Dist. | Resid. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Coast | 1,057 | 536.9 | 31.3 | 320.7 | 116.7 | 44,376 | 15,014 | 71,098 | 13,800 | 1,159 | 517.7 | 36.6 | 341.5 | 143.9 |
| Appalachian: | | | | | | | | | | | | | | |
| District 1 | 111 | 48.9 | 6.3 | 21.9 | 12.0 | 5,687 | 780 | 4,199 | 422 | 75 | 30.7 | 2.1 | 15.5 | 9.3 |
| District 2 | 99 | 58.1 | 6.1 | 35.0 | 8.6 | 3,206 | 494 | 1,789 | 207 | 108 | 56.5 | 5.7 | 21.1 | 11.3 |
| Ind., Ill., Ky. | 1,545 | 786.8 | 84.1 | 348.6 | 130.4 | 30,366 | 7,560 | 31,353 | 5,738 | 1,420 | 725.4 | 77.9 | 311.4 | 156.6 |
| Minn., Wis., Dak. | 126 | 55.1 | 5.1 | 30.6 | 13.6 | 6,670 | 1,836 | 8,918 | 663 | 118 | 55.4 | 4.7 | 29.2 | 16.7 |
| Okla., Kans., Mo. | 656 | 370.6 | 13.3 | 168.7 | 10.3 | 16,295 | 1,773 | 13,211 | 1,009 | 674 | 375.2 | 8.8 | 169.4 | 20.0 |
| Inland Texas | 309 | 210.9 | 8.7 | 44.0 | 21.9 | 7,231 | 640 | 1,470 | 2,777 | 276 | 218.8 | 9.2 | 44.0 | 18.9 |
| Texas Gulf Coast | 1,877 | 937.0 | 120.2 | 516.8 | 116.3 | 22,707 | 3,371 | 17,391 | 5,302 | 1,864 | 972.9 | 124.1 | 473.3 | 128.3 |
| La. Gulf Coast | 743 | 375.6 | 74.0 | 170.8 | 37.7 | 9,727 | 2,080 | 7,347 | 1,274 | 674 | 340.5 | 76.0 | 135.6 | 47.2 |
| N. La. and Ark. | 112 | 67.4 | 3.9 | 28.7 | 6.4 | 6,506 | 650 | 2,796 | 203 | 110 | 66.6 | 6.1 | 21.7 | 5.6 |
| Rocky Mountain: | | | | | | | | | | | | | | |
| New Mexico | 27 | 14.4 | 0.4 | 4.7 | 3.0 | 675 | 53 | 241 | 89 | 14 | 9.8 | 0.3 | 2.5 | 2.2 |
| Other Rocky Mt. | 255 | 119.0 | 5.6 | 56.6 | 29.7 | 4,953 | 592 | 2,635 | 1,185 | 284 | 136.8 | 2.9 | 65.4 | 29.2 |
| West Coast | 1,229 | 558.0 | 61.3 | 176.0 | 295.1 | 24,779 | 1,993 | 14,643 | 17,271 | 1,132 | 527.1 | 32.5 | 184.3 | 241.7 |
| Oct. 27, 1961 | 8,146 | 4,138.7 | 420.3 | 1,923.1 | 801.7 | 183,178 | 36,836 | 177,091 | 49,940 | 7,908 | 4,033.4 | 386.9 | 1,814.9 | 830.9 |
| Oct. 20, 1961 | 8,365 | 4,187.6 | 433.6 | 1,972.6 | 816.9 | 185,305 | 36,485 | 172,957 | 50,408 | ..... | ..... | ..... | ..... | ..... |
| Oct. 28, 1960 | 7,934 | 3,995.4 | 362.1 | 1,850.9 | 816.7 | 186,815 | 36,626 | 178,924 | 49,917 | ..... | ..... | ..... | ..... | ..... |

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

## CRUDE-OIL PRICES

Gravity schedule

| | Signal Hill, Calif. | Oklahoma | West Tex. (sour) | West Tex. (inter.) | No.* Texas | Texas Refugio Light | Bayou Sale (La.) | Denver-Julesburg | Wyo. (sour) |
|---|---|---|---|---|---|---|---|---|---|
| 14-14.9 | $1.86 | .... | .... | .... | .... | .... | .... | .... | .... |
| 15-15.9 | 1.93 | .... | .... | .... | .... | .... | .... | .... | $1.81 |
| 16-16.9 | 2.00 | .... | .... | .... | .... | .... | .... | .... | 1.86 |
| 17-17.9 | 2.06 | .... | .... | .... | .... | .... | .... | .... | 1.91 |
| 18-18.9 | 2.13 | .... | .... | .... | .... | .... | .... | .... | 1.96 |
| 19-19.9 | 2.20 | .... | .... | .... | .... | .... | .... | .... | 2.01 |
| 20-20.9 | 2.27 | $2.49 | †$2.35 | $2.61 | $2.29 | $2.95 | $2.90 | ‡$2.38 | 2.06 |
| 21-21.9 | 2.33 | 2.52 | 2.38 | 2.63 | 2.33 | 2.97 | 2.92 | 2.40 | 2.11 |
| 22-22.9 | 2.40 | 2.55 | 2.41 | 2.65 | 2.37 | 2.99 | 2.94 | 2.42 | 2.16 |
| 23-23.9 | 2.46 | 2.58 | 2.44 | 2.67 | 2.41 | 3.01 | 2.96 | 2.44 | 2.21 |
| 24-24.9 | 2.53 | 2.61 | 2.47 | 2.69 | 2.45 | 3.03 | 2.98 | 2.46 | 2.26 |
| 25-25.9 | 2.60 | 2.64 | 2.50 | 2.71 | 2.49 | 3.05 | 3.00 | 2.48 | 2.31 |
| 26-26.9 | 2.67 | 2.67 | 2.53 | 2.73 | 2.53 | 3.07 | 3.02 | 2.50 | 2.36 |
| 27-27.9 | 2.74 | 2.70 | 2.56 | 2.75 | 2.57 | 3.09 | 3.04 | 2.52 | 2.49 |
| 28-28.9 | 2.81 | 2.73 | 2.59 | 2.77 | 2.61 | 3.11 | 3.06 | 2.54 | 2.54 |
| 29-29.9 | 2.87 | 2.76 | 2.62 | 2.79 | 2.65 | 3.13 | 3.08 | 2.56 | 2.59 |
| 30-30.9 | 2.93 | 2.79 | 2.65 | 2.81 | 2.69 | 3.15 | 3.10 | 2.58 | 2.63 |
| 31-31.9 | 3.00 | 2.82 | 2.68 | 2.83 | 2.73 | 3.17 | 3.12 | 2.60 | 2.67 |
| 32-32.9 | 3.06 | 2.85 | 2.71 | 2.85 | 2.77 | 3.19 | 3.14 | 2.62 | 2.71 |
| 33-33.9 | 3.12 | 2.88 | 2.74 | 2.87 | 2.81 | 3.21 | 3.16 | 2.64 | 2.75 |
| 34-34.9 | 3.17 | 2.91 | 2.77 | 2.89 | 2.85 | 3.23 | 3.18 | 2.66 | 2.79 |
| 35-35.9 | 3.22 | 2.94 | 2.80 | 2.91 | 2.89 | 3.25 | 3.20 | 2.68 | 2.83 |
| 36-36.9 | 3.27 | 2.97 | 2.83 | 2.93 | 2.93 | 3.27 | 3.22 | 2.70 | 2.87 |
| 37-37.9 | 3.31 | 2.99 | 2.86 | 2.95 | 2.95 | 3.29 | 3.24 | 2.72 | 2.89 |
| 38-38.9 | .... | 3.01 | 2.89 | 2.97 | 2.97 | 3.31 | 3.26 | 2.74 | 2.91 |
| 39-39.9 | .... | 3.03 | 2.92 | 2.99 | 2.99 | 3.33 | 3.28 | 2.76 | 2.93 |
| 40-44.9 | .... | 3.05 | 2.95 | 3.01 | 3.01 | 3.35 | 3.30 | 2.78 | 2.95 |

*Cooke, Grayson, Montague. †Other posting starts at $2.55. ‡Some at $2.58.

## FLAT PRICES

| | |
|---|---|
| **Louisiana:** | |
| Sweet Lake | $3.00 |
| **Texas:** | |
| East Texas | 3.10-3.25 |
| Conroe | 3.23-3.53 |
| Van | 2.93-3.08 |
| **Pennsylvania Grade:** | |
| Bradford | $4.80 |
| Middle District | 4.52 |
| Southwest Pennsylvania | 4.25 |
| West Virginia | 4.17 |
| Buckeye Grade | 4.08 |
| **Illinois Basin** | **3.00** |

## FOREIGN

| | |
|---|---|
| **Middle East, Persian Gulf: (cargoes f.o.b. lifting port)** | |
| Arabian, 34.0°-34.9°, Ras Tanura | $1.80 |
| Iranian, 34.0°-34.9°, Bandar Mashur | 1.78 |
| Iranian, 34.0°-34.9°, Abadan | 1.73 |
| Iraq, 35.0°-35.9°, Fao | |
| Kuwait, 31.0°-31.9°, Mina-al-Ahmadi | 1.59 |
| Qatar, 41°-41.9°, Umm said | 1.95 |
| **Middle East, E. Mediterranean:** | |
| Arabian, 34.0°-34.9°, Sidon | $2.17 |
| Iraq, Mosul-Kirkuk, 35.0°-35.9°, Tripoli | 2.19 |
| **Far East (cargoes, f.o.b. Lutong, Sarawak):** | |
| Seria Light, 36° | 2.42 |
| **Canada:** | |
| Leduc-Woodbend | $2.63 |
| Redwater (Alta.) | 2.52 |
| Weyburn (light) | 2.185 |
| Midale C | 1.89 |
| **Venezuela:** | |
| Cumarebo, 47°-47.9°, Tucupido | 3.34 |
| San Joaquin, 40°-40.9°, Puerto La Cruz | 3.08 |
| Oficina, 35°-35.9°, Puerto La Cruz | 2.80 |
| Tia Juana medium, 26°-26.9°, Amuay* | 2.30 |
| Quiriquire, 16.0°-16.4°, Caripito | 2.10 |
| Lagunillas heavy, flat, Las Piedras* | 2.10 |
| Bachaquero, flat, 15°-16°, Las Piedras* | 1.88 |

Price for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

## TANKER RATES (Long ton)

(Latest reported spot fixtures)

| | |
|---|---|
| ★ Gulf-NY, dirty (ATRS—35%) | $1.85 |
| ★ Carib.-NY, dirty (ATRS—39%) | 1.68 |
| ★ Carib.-UK, dirty (Scale—52.5%) (15s. 5d.) | 2.16 |
| ★ PG-NY, dirty (USMC—70%) | 3.81 |
| ★ PG-Japan, dirty (USMC—70% ) | 3.06 |

★ Denotes change from previous week.

## REFINED PRODUCTS

Following quotations are realistic spot prices for refined products moving interstate on Wednesday each week. They may differ from refiners' posted prices and should not be considered as postings.

Light-product prices are in cents per gallon. Residual and crude prices are dollars per barrel. Crude prices are at the well unless otherwise listed.

## GASOLINE*

| | |
|---|---|
| **Mid-Continent (Group 3):** | |
| ★ Regular (91 octane) | 10.00-10.25 |
| ★ Premium (99 octane) | 12.75-13.00 |
| Natural gasoline (26-70) | 4.5 |
| Breckenridge | 4.0 |
| **Gulf Coast (cargoes for coastwise or export movements):** | |
| Regular (90 octane) | 10.50-11.00 |
| Regular (92 octane) | 10.75-11.25 |
| Premium (98 octane) | 11.75-12.25 |
| **California (rack) Los Angeles:** | |
| Regular (90 octane) | 11.20 |
| Premium (94 octane) | 12.20 |
| Premium (100 octane) | 13.35 |
| **Caribbean area (cargoes):** | |
| Regular (87 octane) | 9.00 |
| Premium (97 octane) | 11.50 |

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

## KEROSINE AND DISTILLATE

| | |
|---|---|
| **Mid-Continent (Group 3):** | |
| Kerosine 42-44 | 9.50-9.75 |
| Diesel oil (58 d.i. and above) | 9.00-9.25 |
| Distillate No. 1 | 9.00-9.25 |
| Distillate No. 2 | 8.25-8.50 |
| **Gulf Coast (cargoes):** | |
| Kerosine 41-43 | 9.50 |
| Distillate No. 2 | 8.50 |
| **New York Harbor (barges):** | |
| Kerosine 42-43 | 11.20 |
| Distillate No. 2 | 10.20 |
| Diesel fuel, 48-52 d.i. | 10.35 |
| **Caribbean area (cargoes):** | |
| Distillate No. 2 | 8.10 |

## RESIDUAL FUEL

| | |
|---|---|
| **Mid-Continent (Group 3):** | |
| Residual fuel (max. 1% S) | $1.65-1.75 |
| **Gulf Coast (cargoes):** | |
| Bunker C fuel | 2.20 |
| **New York Harbor (barges):** | |
| Bunker C fuel | 2.52 |
| **Caribbean (cargoes):** | |
| Bunker C fuel | 2.00 |
| **California (rack):** | |
| Bunker C fuel, Los Angeles | 2.25 |

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WESTERN STATES: (California, Washington, Oregon, Idaho, Nevada, Utah, and Arizona). Write: Classified Departments, Inc. The Oil and Gas Journal, 4041 Marlton Ave., Los Angeles 8, Calif. Phone AXminister 2-0287. Copy deadline Monday noon.

### FOR SALE EQUIPMENT

2500 FAILING, 58' mast, 58' derrick for 200 Sullivan 5x8 pump on skids. Fred Butler, Box 481, Pueblo, Colo.

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USED GAS PROCESSING Equipment; Glycol and Dry Dessicant Dehydrators; Quick-cycle Hydracarbon Recovery Units; Water Flood Filter-pump Units. Also new oil and gas production equipment. Engineered Specialties Co., P. O. Box 35683, Phone FL 1-5284, Dallas 35, Texas.

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Boston & Haven St., Baltimore 24, Md.

### FOR SALE EQUIPMENT

THREE LEE C. MOORE Drilling Derricks with sub-structures. Can be seen at Robinson Trucking Yard, Velma, Oklahoma. Call LU 5-8825, Tulsa, or 94K35, Velma.

PUMPING UNIT, Emsco—228,000# Gear—24,200# Beam, 64" Stroke, with Ajax 12 x 15 Gas Engine, located near Magnolia, Arkansas. Arnold Pipe & Supply Co., 3815 Greenwood Rd., Shreveport, Louisiana.

FOR SALE: Failing 1500 heavy duty Rotary. Full hydraulic automatic breakout table, hydraulic hold down. Mounted on 1961 International. 1300 feet of 2⅜" drill pipe, new core barrel, 2 drill collars. Price $18,200.00. Contact: Victor M. Loriaux, Star Route East, Nowata, Oklahoma.

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FOR CATALOG AND PRICES WRITE TO:

**GO PERFORATOR SUPPLY**
Box 1936, Fort Worth, Texas
FOREIGN AND DOMESTIC SALES

### FOR SALE EQUIPMENT

PUMPING UNIT, American-Type 554-356 Floor Clearing, 74" Stroke, with 8¼ x 9" Weber Type 2-MC-50 HP, 2 Cyl. Vertical Gas Engine, located near Lisbon, Louisiana. Arnold Pipe & Supply Co., 3815 Greenwood Rd., Shreveport, Louisiana.

1-Super 38 Wilson double drum well servicing units with 87' derrick, reverse equipment, tubing tongs, etc truck mounted.

1-Mogul 42 Wilson double drum well servicing unit with 87' mast, tubing tongs, hand tools, etc. truck mounted. Box M-616, The Oil and Gas Journal, Tulsa, Oklahoma.

**SALE OR LEASE**

Clark HMA—8 350 BHP gas compressor. 8¼" x 4½" compressor cylinders. Located near Dubois, Penna.

KETA GAS & OIL COMPANY
Box 250, Bradford, Penna.

**AT N. LITTLE ROCK, ARKANSAS**

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Phone POplar 3-3505

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**KINSLOW EQUIPMENT COMPANY**
P. O. Box 5283
WE 9-6896, Tulsa 12, Oklahoma

FOR SALE EQUIPMENT

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## GENERAL WELL DRILLING CO.
FOUR DRILLING RIGS
## ALICE, TEXAS

Beginning Thursday, November 16, 1961 at 9:00 A.M. (CST) and Continuing Until Sold.

Sale Will Be Conducted On Yard Located One Mile North of Alice on Highway 281. Equipment May Be Inspected Anytime Beginning November 8 Until Time of Sale. Everything Sells to the Highest Bidder Without Minimum or Reservation.

PARTIAL LIST

4—DRAWWORKS including Wilson Giant, Bethlehem S45, Brewster N-4 with 87' telescoping mast and Cardwell model D
7—MUD PUMPS including Wilson Snyder, Bethlehem (3), Gardner-Denver (3).
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DRILL PIPE AND COLLARS INCLUDING
6300'—4½" (FH) drill pipe
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40 drill collars including 4⅛", 5¾", 6", & 6¼"
OILFIELD TRUCKS, TRAILERS & CARS
2—R190 Intl. single axle trucks, fully rigged.
1—R190 Intl. tandem truck, fully rigged.
1—30' tandem float
1—Tandem pole trailer
1—Semi-lowboy (H.D.) tandem trailer
2—1958 4 dr. Plymouths
1—1956 4 dr. Buick Century

ALL OTHER DRILLING COMPONENTS INCLUDING: Blocks, Hooks, Swivels, Tongs, Light Plants, Coring Units, Blowout Preventers, Rotarys, Air Compressors, Work Benches, Weight Indicators, Shale Shakers, Mud Tanks, Tool Houses, Pipe Racks, Square Kelly Joints, BJ Bales, Rotary Hoses, Vibrator Hoses, Trailer Mounted Welder, Volume Tanks, Rotary Drive Bushings, Line Pipe, Mud Gauges & Scales, Centrifugal Pumps and Many Other Items Too Numerous To Mention:

FOR COMPLETE LISTING OF EQUIPMENT TO BE SOLD, CONTACT

Wayne Cook Associates, Inc.
*"The Nation's Leading Auctioneers"*
**193 Meadows Bldg.**
**Dallas 6, Texas**
**Phone EM 3-3388**

FOR SALE EQUIPMENT

FOR SALE RA-3 and RA-4 Clark compressors. Alfred B. Kern, 305 Kennedy Bldg. Tulsa, Oklahoma.

1 P-23 WALKER-NEER double-drum unit with spudder attachment on 6 x 6 GMC all tools and ready. Bargain. J. C. Cantrell Box 1016, Ada, Oklahoma.

SALE OR LEASE 1—48 and 1—36L Bucyrus Erie Spudders, purchased new 1954. Keta Gas & Oil Co. Box 250. Bradford, Penna.

EQUIPMENT WANTED

DESIRE 1—approximately 10 x 40 welded steel tank. Must be good condition suitable for storage of liquid sulphur. National Sulphur Company, Box 91, Midland, Texas.

## TANKS—WANTED

6—12'x10' 202 Bbl. and 8—10'x15' 210 Bbl.

No. 1 Used Welded Steel Stock Tanks. Give complete description, manufacturer's name and quote price present location also price delivered our property Gorham, Kansas. Contact H. D. Lawver, Home-Stake Production Company, 2302 Philtower Bldg., Phone LU 4-5281, Tulsa, Oklahoma.

HELP WANTED

## PROJECT MANAGERS
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for

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Please send complete resume to Project Personnel

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HELP WANTED

WANTED—Manufacturer's Representative for Kansas and Texas Panhandle for established Line Complete Oil Well Subsurface Pumping and Production Equipment. Write. M-615, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER — PRODUCTION SUPERINTENDENT, Petroleum Engineer or Geological Engineer having 7-10 years experience with 7 years secondary recovery experience in unitization, design and operation. Location: Illinois Basin. All replies will be considered confidential. Send complete resume' with salary requirements and available date of employment to: Box M-609 The Oil and Gas Journal, Tulsa, Oklahoma.

## MECHANICAL ENGINEER

Company growth has created need for a graduate Mechanical Engineer for Products Pipe Line Co. in Los Angeles. Applicants should have 5 to 10 years pipe line industry experience, preferably in products. Please send complete resume including salary information to Box 31 Q 282, The Oil and Gas Journal, 4041 Marlton Ave., Los Angeles 8, Cal.

## ENGINEER

Position in economic section of engineering department. Covers wide variety of preliminary design, cost estimating, and evaluation work dealing with present operations, regulatory commissions and diversification projects.

Applicant must have engineering degree; interest in economic aspects of engineering; and 1 to 5 years experience.

Salary commensurate with experience.

Headquarters in Colorado Springs.

Send resume of education and experience to

Employee Relations Department
**COLORADO INTERSTATE GAS COMPANY**
BOX 1087
COLORADO SPRINGS, COLORADO

## CORROSION CHEMIST

Career opportunity for chemist with minimum of 2-3 years experience in development of corrosion inhibitors for petroleum industry, either production or refining. Work in modern new laboratory for company that pioneered the Tretolite line of KONTOL Corrosion Inhibitors for the petroleum industry.

MS or PhD degree in Chemistry, Metallurgy, or Chemical Engineering. All replies held in strict confidence. Write to:

Director of Research

PETROLITE CORPORATION
369 Marshall Avenue / Saint Louis 19, Missouri

## HELP WANTED

**OIL JOB DIRECTORY, foreign and domestic, showing where to apply for jobs $5.00 cash OIML Co., Box 2603, Tulsa, Oklahoma.**

BRIGHT FUTURE for professional stratigrapher with 5 to 6 years carbonate experience, or well-site geologist with strong sample background to manage branch office of a growing, progressive service company covering Appalachians. Call LOcust 3-7011 or LOcust 1-1522, Pittsburgh, Pennsylvania as we are hiring now.

TRANSLATORS-ENGINEERS WANTED—Proven ability to translate technical material into fluent English essential. Attractive full time or free-lance arrangement. All languages of interest, particularly Russian & Japanese. Send resume to: A•T•S, Inc., Drawer 271, East Orange, N. J.

**GEOLOGIST WANTED**

Independent forming exploration department needs experienced geologist to head department. Principal operations in Permian Basin and Four Corners Areas. Must be able to evaluate proposals submitted by others but primary responsibility to be in preparing own prospects. Give background, education and experience. All replies confidential. Box M-620, The Oil and Gas Journal, Tulsa, Oklahoma.

**CHEMICAL ENGINEER**

For new Petrochemical Plant in Houston, Texas. Requires 2 to 5 years experience in operations or technical service. An excellent opportunity for a man seeking a responsible position in a small company with growth potential. Send resume to:

**SINCLAIR-KOPPERS CHEMICAL COMPANY**
P. O. Box 5536, Houston 12, Texas

**WELL-SITE GEOLOGIST**

Immediate opening. Age 30-35. Minimum five years concentrated sample examination experience in the Mid-Continent, Rocky Mountain or West Texas area. Free to relocate. First location in Nebraska. Salary commensurate with ability and experience. Send resume and recent photo to Hunt Oil Co., 700 Mercantile Bank Bldg., Dallas 1, Texas. Atten: Personnel Dept.

## SITUATIONS WANTED

GEOLOGIST, 41 M.A. 4½ years experience major California Company. 2½ years experience subsurface-development geologist in Brazil. Desires position with aggressive company or independent, foreign or domestic. Complete resume on request: Box M-604, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION MAN thoroughly experienced in producing properties, well completions, and workovers wants position as production foreman or superintendent with growing independent. References upon request. Will relocate. Box M-621, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPELINE ENGINEER—Project, Design, Estimating, Mechanical, Civil, General. Registered Professional Engineer and Land Surveyor. 30 years diversified experience. No degree but equivalent education plus excellent experience record. Write at once. P. O. Box 19163, Houston 24, Texas.

## SITUATIONS WANTED

PETROLEUM ENGINEER—Ten years well rounded experience, production and drilling in the Southwest and Appalachian's. Ability to put forth maximum effort. Consideration will be given to all replies, foreign and domestic. Box M-622, The Oil and Gas Journal, Tulsa, Oklahoma.

## PRODUCTION WANTED

WANTED: marginal or isolated production. Fast quotes, good prices. Contact Joe A. Huitt, 1306 Philtower, LU 7-3080, Tulsa, Oklahoma.

WORLD'S LARGEST investors are ready buyers and can handle vast quantities of primary and secondary oil production, gas production national or foreign. Gold, silver, platinum, and all other rare metals, also. Send complete information. Must stand strict checking. Box M-619, The Oil and Gas Journal, Tulsa, Oklahoma.

## BUSINESS OPPORTUNITIES

EMINENT GEOLOGIST seeks private investor capital to drill proven well selected oil leases in Bowling Green area of Kentucky. Three prolific pay zones with seven pay sands from 375 ft. to 850 ft. High gravity oil. No proration. Good economical conditions for excellent profits. Good management assured. Box M-624, The Oil and Gas Journal, Tulsa, Oklahoma.

FINANCIAL—Investment Banking Houses and Underwriters reached. Confidential You can send the details of your proposition direct or thru your attorney to Consultant 817—51st Street, Brooklyn, N. Y.

OIL, Gas and mining exploration prospects in Saskatchewan, Canada, for year end tax dollar expenditure. For details, write Box M-607, The Oil and Gas Journal, Tulsa, Oklahoma.

$3,000,000.00 copper deposit recoverable by leaching (process similar to secondary recovery of oil by water flooding). Will assign half interest for $5,000. To install units; less if you have used pipe and water pumps. Write for engineering data.

Box 117, Encino, New Mexico.

WILL PAY CASH FOR MANUFACTURING OR INDUSTRIAL PLANTS, CONSTRUCTION OR TRUCKING COMPANIES WITH ASSETS $250,000.00 OR LARGER. PRINCIPALS NOT AGENTS. WRITE BOX 8257, DALLAS, TEXAS.

**DO YOU HAVE A TAX PROBLEM?**
**DO YOU WANT TO BROADEN YOUR BASE OF OPERATION?**
**DO YOU WANT TO ACQUIRE LEASES AND PRODUCTION IN MICHIGAN?**

An interesting situation has developed that has excellent possibilities for the producer or investor. Does not require SEC approval. We invite inquiries from qualified rated principals.

Box M-623, The Oil and Gas Journal
Tulsa, Oklahoma

## ROYALTIES

FOR SALE at bargain price—53 acres of minerals under 17N-23W and 23N-25W; 53 acres of surface only under 24N-25W and 24N-26W; 59 acres land owners royalty in 18N-25W all in Ellis County, Okla. Write: Marynel Chabino, Box 812, Oklahoma City or call CEntral 6-5405.

ROYALTY BUYERS—Income producing gas-distillate royalty, new, deep, dual completed wells, Texas Gulf Coast. Tax benefits being 27½% of depletion allowance. Ogden Oil Company, P. O. Box 409, Taylor, Texas.

## LEASE AND DRILLING BLOCKS

HAVE 70,000 ACRES Southeast Georgia, 10 year leases on Gravity Surveys. Gas and oil seepages in area. Want partner to furnish truck-mounted rotary slim hole drill rig for test drilling five wells through Tusculoosa or 4,500 ft., or help financing drilling deal for interest in acreage or farmout. Will sell 10,000 acre block with good geology reasonable. Chance to win $250,000.00 reward from state. Open for any legal deal for immediate drilling. T. R. Davis, 601 Jackson Street, Vidalia, Georgia. Phone 3639.

DO YOU HAVE A LEASE TO SELL? For as little as $5 per week you can tell your proposition to over 45,000 oil men through the Journal's classified advertising pages. You'll be surprised how many are interested.

READY TO DRILL direct offset well to Bartlesville Sand. Production three sides. Proven lease. Need three associates. S & M Drilling Production Co., Box 59, Cherryvale, Kansas.

FOR SALE: Up to ⅛ interest 40 acres offsetting new water flood. One well pumping, good investment for nice income, more good locations to drill. Montgomery County, Kansas. Bartlesville production 730 feet. Box M-593, The Oil and Gas Journal, Tulsa Oklahoma.

FOR LEASE: Mineral rights; 3,458 acres block 1, and for sale 357 acres block 2, Val Verde County, Texas. Brown-Bassett field, Payne, 2100 B. Kenwood, Austin, Texas.

EIGHTY ACRE oil and gas lease Mesa County, Colorado. T-10S: R-103W; Meridian 6 P. M. Section 29. Write P. O. Box 282, Redwood City, California.

TWO WELLS Clarenton Field, Newcastle, Wyoming. One producing 120 bbls. a month. Sell at salvage, $12,500 each. Contact James Geisler, 119 Monona Ave., Madison 3, Wisconsin.

## BUSINESS SERVICE

LEASE OPERATION and contract pumping in the Ark-La-Tex area within 100 mi. radius of Shreveport. Contact R. H. Langton, P. O. Box 1355, Shreveport, La. Phone 42-21438.

LIST OF 100 oil companies showing names of land-leasing managers and division land managers. $5.00. Oil Industry Mailing List, 405 Tuloma Bldg., Tulsa, Okla. (100 chief geologists. $5.00. Both lists. $9.00. Cash)

DELAWARE CORPORATION formed and serviced American Guaranty Trust Company. P. O. Box 487, Wilmington, Delaware.

## OIL MAPS

**OIL LEASE MAPS**
**MORROW-MARION COUNTIES**
**OHIO** **JENKINS ENGINEERING**
**Phone 9186** **CARDINGTON, O.**

## LEGAL

SEALED BIDS FOR oil and gas leases on allotted and tribal Indian lands in Payne, Noble, Pawnee and Kay Counties, Oklahoma, will be received until Thursday, November 16, 1961, at 2:00 p. m., C.S.T., at the Pawnee area field office, P. O. Box 97, Pawnee, Oklahoma. Leasing will be governed by regulations of the Secretary of the Interior.


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**CLOSING DATE:** 15th of month preceding month of publication.

**Write:** Classified Department, Oil and Gas International, P. O. Box 1260, Tulsa, Oklahoma.

# DISCOVERIES

### Western Canada

Alberta:

Central Del Rio et al. 2-30 Fenn, LSD 2, 30-35-19w4. Viking gas discovery. TD 7,156 ft.

Devonian Palmer 6-2 Acadia, LSD 6, 2-24-4w4. Viking gas discovery. TD 3,192 ft.

### Colorado

Baca County:

Horizon Oil & Gas Co. 1-12 Trahern, C NW SE 12-32s-43w. IPF 2,600 M.c.f.d., Topeka 3,205-20 ft. TD 3,250 ft. Topeka discovery, new field.

### Michigan

Livingston County:

Humble Oil & Refining Co. 1 Soule, C NE NE 2-3n-3e, Handy Twp., 7 miles northwest Howell gas field. FAIP 1,218 M.c.f. TD 5,685 ft. A-1 3,748 ft., Niagara 3,824 ft., Trenton 4,746 ft., perf. 3,830-55 ft., 3,880-3,900 ft. New gas pool.

### Montana

Yellowstone County, Laurel area:

King Oil Co. 1 Van Winkle, NE SE 23-2n-24e. IPP 19 BOPD, Dakota open hole 935-940 ft. TD 1,000 ft. Dakota discovery, new field.

### New Mexico

Lea County:

Continental Oil Co. 1-19 I. J. Marshall, 29 miles southwest of Eunice in 19-23s-33e. IPF 271 BOPD, 20/64-in. choke, 40°, GOR 627:1, TP 150 psi., CP 500 psi., Delaware sand 5,095-99 ft. TD 5,237 ft. New oil discovery.

### West Texas

Concho County:

Paint Rock Goen lime field. Holland Oil Co. et al. 1 Marion Hays, 4½ miles southeast of Paint Rock in Sec. 135, Blk. 72, T&NO Sur. IPCAOF 350 M.M.c.f.d., Goen lime 3,376-86 ft. TD 3,683 ft. New gas discovery.

Crane County:

Lawliss Drilling Co. 1-B J. T. Cross, Sec. 3, Blk. B-22, PSL Sur., 6 miles southwest of Penwell. IPP 47 BOPD, plus 39% water, 35°, GOR 965:1, lower Clearfork 5,548-74 and 5,636-70 ft.

### Wyoming

Sweetwater County:

Stateswide Oil et al. 1-10 Government, NE NE 10-21n-99w. IPF 720 M.c.f.d. and 4 bbl. water per hour, ½-in. choke, Lewis 3,848-58 ft. TD 5,185 ft. Lewis discovery, new field.

### Utah

Emery County:

Grassy Trail area. Cities Service Petroleum Co. 1 Government, OWWO. OTD 7,980 ft. IPP 84½ bbl. oil, ½ bbl. water per day, Moenkopi 3,872-3,906 ft. TD 7,980 ft. Moenkopi discovery, new field.

Uintah County, Stagecoach unit:

Belco Petroleum Co. 2 Unit, C SE SE 28-8s-21e. IPF 335 M.c.f.d., 2-in. choke, 3-hour test, SICP 2,734 psi., Wasatch 6,400-6,894 ft. TD 7,195 ft. PB 6,915 ft. Wasatch discovery, new field.

Uintah County, Southeast Uintah area:

Delhi-Taylor Oil Corp. 1-15 Government, SW NE 15-12s-21e. IPF 3,569 M.c.f.d., ¾-in. choke, TP 977 psi., Wasatch Tertiary 4,924-5,050 ft. TD 6,524 ft. PB 5,140 ft. Wasatch discovery, new field.

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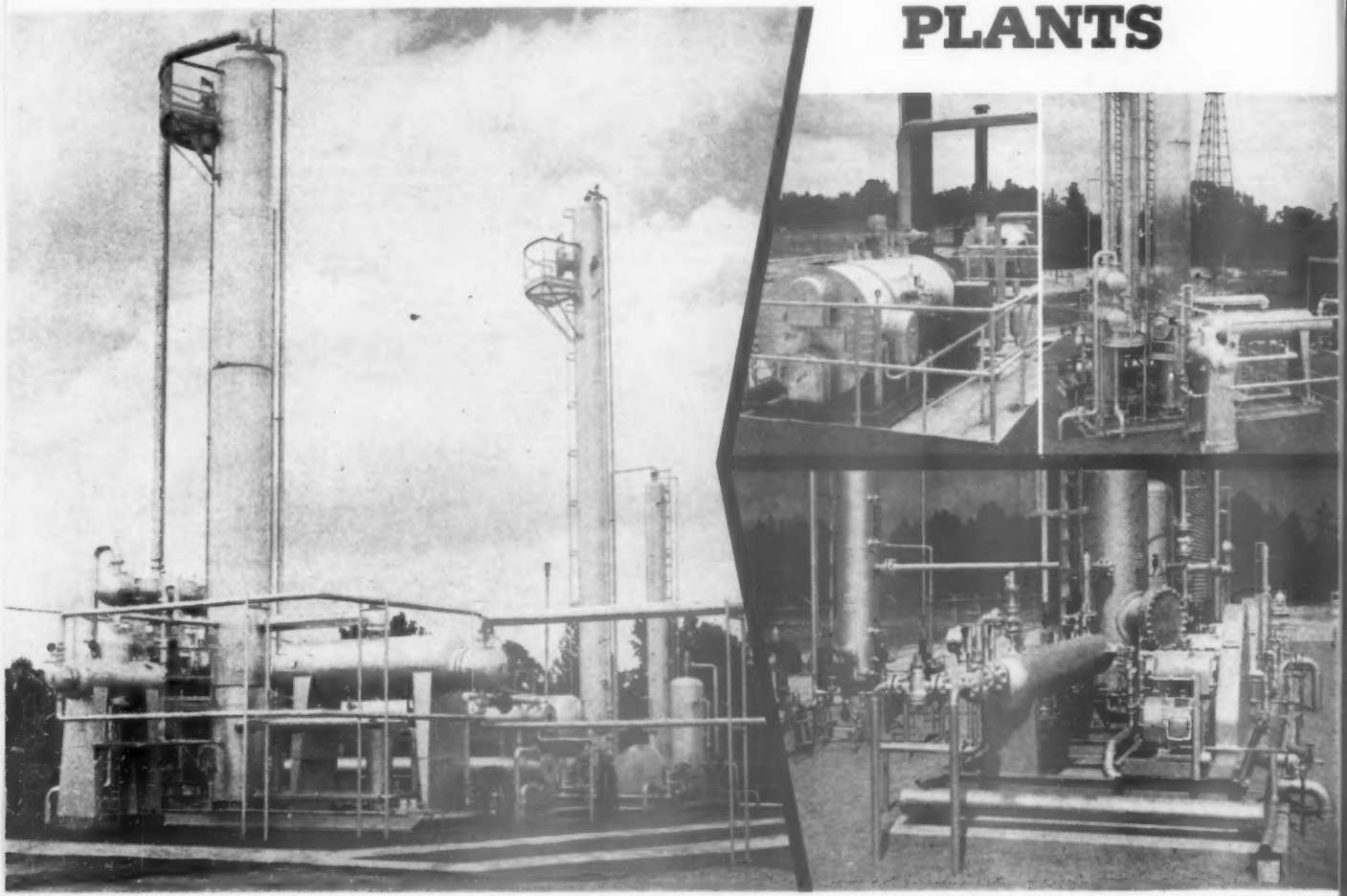
# NATIONAL®

# MONOETHANOLAMINE PLANTS



Acid gas removal from a 3,500 mfc feed stream containing about 10% $H_2S$ and $CO_2$ is accomplished in this National M.E.A. Plant—COMPLETELY AUTOMATED FOR UNATTENDED OPERATION!

The unit, in Southern Arkansas, is built in conjunction with a National Glycol Dehydration Unit.

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TULSA, OKLAHOMA

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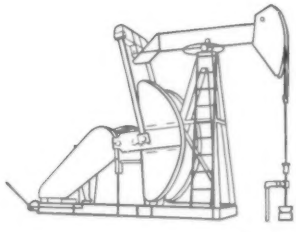

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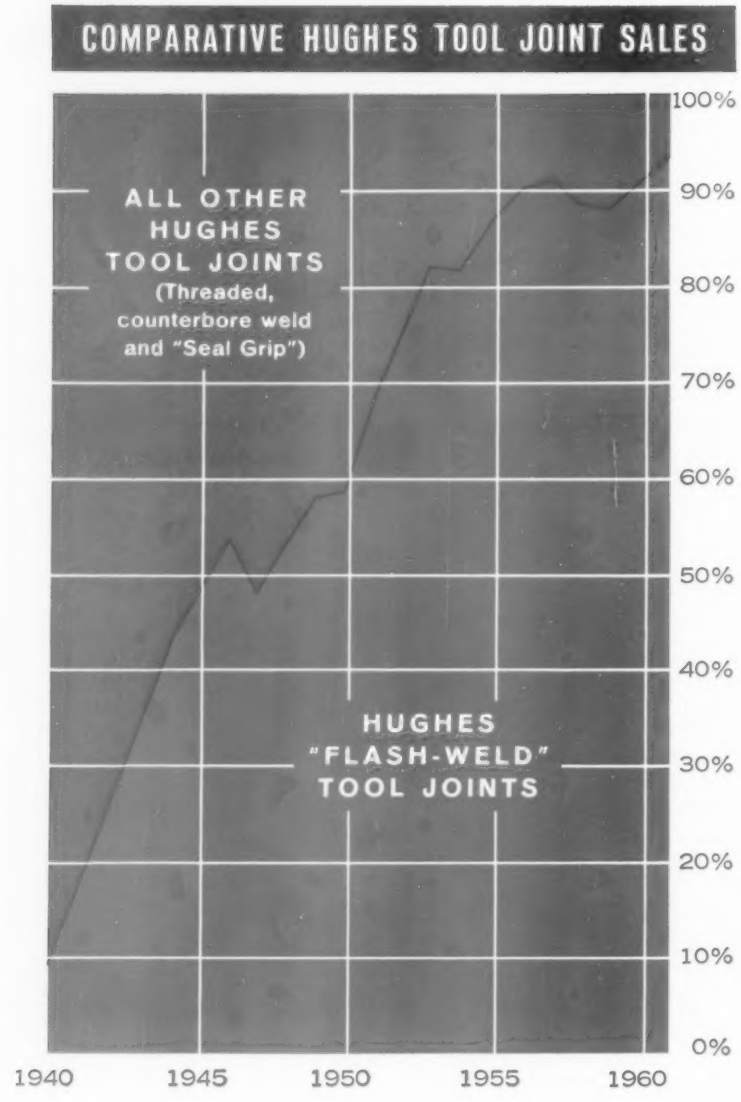
# Demand for "Flash-Weld" goes up and UP!




***There must be a reason why!***

More than 90% of all **Hughes** tool joints placed in service in the United States and Canada during the past year have been "Flash-Weld." The percentage of "Flash-Weld" tool joints in use has been climbing steadily since 1940, when only 10% of Hughes tool joints were "Flash-Weld."

The reason for this increasing demand for the Hughes flash-welded type of tool joints is their proven economy and dependability.

**As for economy,** look at the facts: "Flash-Weld" joints can be field hardfaced as often as necessary, eliminating the cost of replacing joints. The saving during the life of a 10,000-foot string can run to $20,000 or more. For details ask your local Hughes representative.

**As for dependability,** the record speaks for itself. In 23 years, 50 million feet of drill pipe have been unitized with Hughes "Flash-Weld" joints. This experience has resulted in continued improvement in Hughes' "Flash-Weld" design and processing techniques.

Hughes "Flash-Weld" construction is your answer to greater drill stem economy and dependability . . . any place in the world!

FLASH-WELD
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